

NOTE

This Microfiche meets the quality requirements of the American National Standard for Microfiche of Documents (ANSI PH5.9-1975). However, because of imperfections in the document from which it was made, it contains images that are illegible or difficult to read. The source document for this microfiche is the best copy that could be obtained prior to filming.

Office of Technology Assessment

Congressional Board of the 97th Congress

TED STEVENS, *Alaska, Chairman*

MORRIS K. UDALL, *Arizona, Vice Chairman*

Senate

ORRIN G. HATCH
Utah

CHARLES McC. MATHIAS, JR.
Maryland

EDWARD M. KENNEDY
Massachusetts

ERNEST F. HOLLINGS
South Carolina

HOWARD W. CANNON
Nevada

House

GEORGE E. BROWN, JR.
California

JOHN D. DINGELL
Michigan

LARRY WINN, JR.
Kansas

CLARENCE E. MILLER
Ohio

COOPER EVANS
Iowa

JOHN H. GIBBONS
(Nonvoting)

Advisory Council

CHARLES N. KIMBALL, *Chairman*
Midwest Research Institute

EARL BEISTLINE
University of Alaska

CHARLES A. BOWSHER
General Accounting Office

CLAIRE T. DEDRICK
California Land Commission

JAMES C. FLETCHER
University of Pittsburgh

S. DAVID FREEMAN
Tennessee Valley Authority

GILBERT GUDE
Congressional Research Service

CARL N. HODGES
University of Arizona

RACHEL McCULLOCH
University of Wisconsin

WILLIAM J. PERRY
Hambrecht & Quist

DAVID S. POTTER
General Motors Corp.

LEWIS THOMAS
*Memorial Sloan-Kettering
Cancer Center*

Director

JOHN H. GIBBONS

**This is an OTA Background Paper that has neither been reviewed nor approved
by the Technology Assessment Board**

J952-44

An Assessment of

Development and Production Potential of Federal Coal Leases

Volume II—Working Papers

**Part D: Review of Undeveloped Federal Coal Leases
in Utah**

October 1982



CONGRESS OF THE UNITED STATES
Office of Technology Assessment
Washington, D. C. 20510

Preface

This volume contains papers written for OTA to assist in preparation of the report *An Assessment of Development and Production Potential of Federal Coal Leases*. OTA does not endorse these papers. In several instances, the OTA report reaches somewhat different conclusions because of additional information which was obtained later. These papers, however, may prove valuable for readers needing more detailed or specific information than could be accommodated in the final assessment report, and are being made available for such purposes.

OTA WORKING PAPER D

REVIEW OF UNDEVELOPED FEDERAL COAL LEASES IN UTAH

RESULTS OF OTA UTAH COAL LEASING TASK FORCE

FINAL REPORT

JUNE 1980

CONGRESS OF THE UNITED STATES
OFFICE OF TECHNOLOGY ASSESSMENT
MATERIALS PROGRAM
WASHINGTON, D.C. 20510

Karen L. Larsen
Associate Project Director

Nancy Greenbaum
Staff Consultant

Carol A. Drohan
Patricia A. Canavan
Support Staff

This is an OTA Working Paper that was used in preparation of OTA's final report on Federal Coal Leasing. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of OTA or the Technology Assessment Board. This report has not been reviewed or approved by the Technology Assessment Board.

FOREWORD

This report summarizes the results of OTA's coal leasing task force held in Salt Lake City, Utah in February 1980 and OTA's assessment of the development potential of 123 Federal coal leases without mine plans in Utah. This report is the first of five state task force reports that were prepared as part of OTA's evaluation of existing federal coal leases and preference right lease applications requested under section 10 of the Federal Coal Leasing Amendments Act of 1976, Public Law 94-377. OTA's final report, An Assessment of Development and Production Potential of Federal Coal Leases, was published in December 1981.

As part of the evaluation process, all undeveloped Federal leases were rated according to their overall prospects for going into production by 1991: favorable, uncertain, or unfavorable. The ratings were based on the amount and quality of the reserves under lease, the engineering, environmental, legal, and transportation considerations affecting mine development and potential markets for Utah coal. The task force ratings were used with additional technical and economic analyses to estimate the potential production from existing leases in Utah and to identify the major factors that will influence coal development in the State.

Information for this report was drawn from a variety of sources, including issue papers especially prepared for the OTA task force. on coal lease ownership patterns, mining and reclamation conditions, and future markets for Utah coal. One task force issue paper, "Market Factors Associated with the Assessment of the Development Potential of Federal Leases in Utah" is included in the appendix of this report. Technical analyses of the undeveloped leases were prepared by OTA staff for the task force. The draft version of the final report was distributed for review and comment in June 1980. This final report is essentially unchanged from the June 1980 review draft. The Utah task force was the first of 5 OTA state coal leasing task forces and established the model on which other task forces were run. Consequently, the Utah task force reports contains a more detailed discussion of OTA's methodology for assessing undeveloped federal coal leases than is found in the other state reports.

Since the final Utah task force report was completed, several major uncertainties affecting coal development in Utah have been resolved:

- o Projections of future demand for Utah coal have been increased because of expanded foreign export interest. The DOE 1980 updated Utah coal production goals are: 35.9 million tons (low level); 48.8 million tons (mid level); and 63 million tons (high level). (See Appendix.)

- o The Allen Warner Valley Energy System has been indefinitely deferred because two major sponsors, Southern California Edison and Pacific Gas and Electric Co. (PG&E), have withdrawn from the project. In addition, EPA notified the project sponsors that its air quality permit application did not show that the air quality in class I Zion National Park would be adequately protected.

- o In December 1980, Interior Secretary Andrus designated about 9,000 acres of the Alton leases as unsuitable for surface mining, thus removing approximately 24 million tons of recoverable reserves from the proposed surface mine. The decision has been appealed to federal district court.

- o Secretary of the Interior, James G. Watt, denied the Utah Power and Light Co. (UP&L) lease exchange authorized by P.L.95-554. In early 1982, the Department of the Interior approved UP&L's preference right lease applications on the northern section of the Kaiparowits Plateau.

- o In late 1981, Pacific Gas and Electric's coal mining subsidiary, Eureka Energy, sold its Utah lease reserves to the Sunedco subsidiary of the Sun Company. One undeveloped lease was involved in the transfer.

- o In 1981-82 several lease sales were held in the Uinta-Southwestern Utah region adding over 80 million tons of recoverable reserves in new leases. In the first sales, the new leases were acquired by operators who hold other federal leases nearby and who will probably use the additional reserves to expand or extend production at existing mines. (A list of new leases is included in the Appendix.)

OTA's analysis of federal coal leases in mining plans conducted after the Utah task force evaluation of undeveloped leases identified approximately 32 million tons per year

production capacity in operations with approved mine plans, another 43 million tons per year in operations with pending plans, including 50 leases classified as undeveloped in this report, and approximately 18 to 28 million tons per year of additional annual production capacity in the leases classified as favorable or uncertain development prospects in the task force. In OTA's review of lease classifications after the task force, no classifications were changed.

This state task force report is an OTA Working Paper that was used in the preparation of OTA's final report on Federal coal leasing. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of OTA or the Technology Assessment Board. This report has not been reviewed or approved by the Technology Assessment Board.

Questions and comments concerning this report should be directed to Ms. Karen Larsen, Associate Project Director, OTA Materials Program, U.S. Congress, Washington, D.C. 20510. (202) 226-2269

CONTENTS

	Page
SUMMARY	v
BACKGROUND ON OTA COAL LEASING STUDY	1
OTA TASK FORCES	3
DEVELOPMENT STATUS OF EXISTING FEDERAL COAL LEASES IN UTAH	5
EVALUATION OF THE DEVELOPMENT PROSPECTS OF FEDERAL LEASES WITHOUT MINE PLANS	11
DEVELOPMENT OF THRESHOLD CRITERIA FOR VIABLE NEW COAL MINE PROPERTIES	16
APPLICATION OF INITIAL SCREENING PROCESS FOR UNDEVELOPED FEDERAL LEASES IN UTAH	18
ALL LEASES IN THE TRACT ARE HELD BY THE SAME OWNER	19
THE LEASE TRACT FORMS A COMPACT AND CONTIGUOUS UNIT	19
THE LEASE BLOCK HAS SUFFICIENT RECOVERABLE RESERVES TO SUPPORT AN AVERAGE NEW MINE	21
THE COAL RESERVES MEET THE MINIMUM COAL QUALITY STANDARDS FOR END USE	24
GEOLOGIC CHARACTERISTICS OF THE COAL RESERVES AND THE TOPOGRAPHIC CONDITIONS DO NOT IMPOSE UNUSUAL RESTRICTIONS ON MINE DESIGN OR COAL RECOVERY	25
THE LESSEE HAS THE FINANCIAL CAPABILITY OR COAL MINING EXPERIENCE TO DEVELOP THE LEASE	26
RESULTS OF THE INITIAL SCREENING	30
EVALUATION OF OTHER FACTORS AFFECTING LEASE DEVELOPMENT PROSPECTS	33
PREPARATION FOR THE TASK FORCE	36
PRELIMINARY ISSUE IDENTIFICATION	37
RESULTS OF OTA UTAH COAL LEASING TASK FORCE	39
TASK FORCE ASSUMPTIONS USED IN LEASE EVALUATION	40
TIME REQUIRED TO DEVELOP A MINE	40
NEW MINE MODELS	40
POTENTIAL MARKET FOR UTAH COAL	42
OWNERSHIP TRENDS	44

	Page
TASK FORCE CLASSIFICATION OF LEASE PROPERTY CHARACTERISTICS	45
TASK FORCE CLASSIFICATION OF PROSPECTS FOR DEVELOPMENT OF LEASE BLOCKS	48
TASK FORCE OBSERVATIONS AND CONCLUSIONS ON OTHER FACTORS AFFECTING LEASE DEVELOPMENT PROSPECTS	51
SUMMARY OF CONCLUSIONS ON COAL DEVELOPMENT FACTORS IN CENTRAL UTAH	51
SUMMARY OF CONCLUSIONS ON COAL DEVELOPMENT FACTORS IN SOUTHERN UTAH	55
RELATIVE IMPORTANCE OF FACTORS AFFECTING DEVELOPMENT	60
OTA REVIEW OF TASK FORCE CONCLUSIONS	61
OTA EVALUATION OF LEASE DEVELOPMENT PROSPECTS	61
CONCLUSIONS AND IMPLICATIONS OF ANALYSIS OF LEASE CLASSIFICATIONS	67
CLASSIFICATION OF LEASES FOR FURTHER ANALYSIS	69
ISSUES AND UNCERTAINTIES AFFECTING COAL DEVELOPMENT IN UTAH	73
UNCERTAINTIES RELATED TO FUTURE MARKETS FOR UTAH COAL	75
CHANGING STRUCTURE OF THE UTAH COAL INDUSTRY	87
ENFORCEMENT OF THE DEPARTMENT OF THE INTERIOR'S DILIGENCE REQUIREMENTS	90
NEW FEDERAL LEASING	95
SOUTHERN UTAH COAL DEVELOPMENT	101
APPENDIX	112
A. LIST OF PARTICIPANTS IN OTA COAL LEASING TASK FORCE	113
B. MAPS OF UTAH COAL FIELDS AND UNDEVELOPED FEDERAL LEASES	114
C. FEDERAL COAL LEASES IN UTAH - DEVELOPMENT STATUS INDEX	118
D. QUESTIONS FOR THE TASK FORCE TO CONSIDER IN EVALUATING THE DEVELOPMENT PROSPECTS OF EXISTING FEDERAL COAL LEASES	127
E. 1980 DOE UPDATED COAL PRODUCTION GOALS FOR UTAH AND OTHER WESTERN COAL REGIONS	132
F. RESULTS OF NEW LEASE SALES IN THE UTAH SOUTHWESTERN UTAH COAL REGION, 1981-1982	135
G. ISSUE PAPER: "MARKET FACTORS ASSOCIATED WITH THE ASSESSMENT OF THE DEVELOPMENT POTENTIAL OF FEDERAL COAL LEASES IN UTAH	136

LIST OF TABLES

		Page
TABLE A	SUMMARY OF ANALYSIS OF UNDEVELOPED FEDERAL COAL LEASES IN UTAH	xix
TABLE 1	SURFACE ACREAGE OF LEASES, BY STATE AND BY SURFACE OWNERSHIP: SEPTEMBER 30, 1979	7
TABLE 2	NUMBER OF LEASES, ACREAGE, AND RECOVERABLE RESERVES OF FEDERAL LEASES IN UTAH BY MINE PLAN STATUS	8
TABLE 3	DEVELOPMENT STATUS OF EXISTING FEDERAL COAL LEASES IN UTAH	9
TABLE 4	NUMBER OF LEASES, ACREAGE, AND MINE PLAN STATUS OF FEDERAL LEASES IN UTAH, BY COUNTY	10
TABLE 5	SUMMARY OF CSMRI CONVENTIONAL MINE MODELS FOR UTAH COAL FIELDS	13
TABLE 6	INITIAL SCREENING PROCESS FOR UNDEVELOPED FEDERAL COAL LEASES	14
TABLE 7	UTAH LEASE BLOCKS	20
TABLE 8	BUSINESS CATEGORIES OF LESSEES OF UNDEVELOPED FEDERAL COAL LEASES IN UTAH	29
TABLE 9	SUMMARY OF ANALYSIS OF UNDEVELOPED FEDERAL COAL LEASES IN UTAH	32
TABLE 10	DOE WESTERN COAL SURVEY 1981, CAPACITY AND PRODUCTION FOR EXISTING AND PLANNED MINES IN UTAH	78
TABLE 11	CAPACITY BY YEAR OF COAL MINES IN DEVELOPMENT, EXPANSION, OR PLANNING STAGES IN CARBON, EMERY, SEVIER, OR WAYNE COUNTIES, UTAH FOR 1977 AND 1979 KEYSTONE SURVEYS	80
TABLE 12	CAPACITY BY YEAR OF COAL MINES IN 1977 AND 1979 KEYSTONE SURVEYS	81
TABLE 13	COAL FIRED GENERATING PLANTS IN ARIZONA, COLORADO, NEVADA, NEW MEXICO, UTAH AND WYOMING: 1977 COAL CONSUMPTION AND FUEL COSTS	83
TABLE 14	COAL FIRED GENERATION ADDITIONS, UTAH, NEVADA AND CALIFORNIA 1980-1988	84
TABLE 15	DISTRIBUTION OF FEDERAL LEASES IN UTAH BY PRINCIPAL LINE OF BUSINESS ACTIVITY (1980)	89

TABLE 16	SUMMARY OF PROPOSED NEW LEASING TRACTS IN CENTRAL UTAH	97
TABLE 17	PENDING PREFERENCE RIGHT LEASE APPLICATIONS IN UTAH	100
TABLE 18	UTAH POWER & LIGHT CO. EXPRESSIONS OF INTEREST FOR NEW LEASE SALES AND EXCHANGES	100

MAPS

PROPOSED ALLEN-WARNER VALLEY ENERGY SYSTEM	105
INDEX MAP SHOWING SOUTHERN AND CENTRAL UTAH REGIONS AND PRINCIPAL COAL FIELDS	115
UTAH LEASE MAPS SHOWING LOCATION OF UNDEVELOPED LEASE BLOCKS	116

SUMMARY OF OTA REVIEW OF UNDEVELOPED COAL LEASES IN UTAH
AND RESULTS OF UTAH COAL LEASING TASK FORCE

OTA has recently completed its review of federal coal leases without mining plans in the state of Utah. This document summarizes the results of that evaluation and the results of an OTA sponsored task force on the development prospects of these nonproducing leases. This document is being distributed for review purposes only. All findings and classifications are preliminary and subject to modification where appropriate as the study proceeds. This document has not been reviewed or approved by the Technology Assessment Board.

Evaluation of Undeveloped Federal Coal Leases

As part of the coal leasing study mandated by P.L. 94-377, the Federal Coal Leasing Amendments Act of 1976, OTA is required to make an independent evaluation of the development potential of the more than 500 existing federal coal leases. To complete the analysis requested, OTA must obtain and review information on the development prospects and potential coal production capacity of all existing leases. For leases that are part of active mining operations or are covered by a pending mining plan, the mining plan is probably the best source of information on the lessee's development plans and production capability. OTA will use technical contractors to review and summarize the current mining plans to obtain the information and analyses required to complete the tasks specified in the requesting legislation. For those leases that are not covered by a mining plan (hereafter "undeveloped" leases), there is no such readily available compendium of information on the characteristics of the lease or the lessee's development intentions. For these undeveloped leases, OTA has

adopted an approach for evaluating the lease tracts that approximates the process used by a potential developer in identifying a favorable mining property that merits more exhaustive analysis. The OTA approach involves two levels of analysis.

The first is an initial screening of the undeveloped lease blocks to identify those lease blocks that could support a viable new mine under expected conditions in the next decade. The threshold screening criteria for Utah were developed by OTA based on consultations with the USGS Mining Supervisor, with the Utah Geological and Mineral Survey (UGMS), and with coal industry representatives and on a report on typical new mine profiles prepared for OTA by The Colorado School of Mines Research Institute (CSMRI). (See Table 6 for a summary of the initial screening process and Table 5 for the typical Utah mine profile.)

The second part of the undeveloped lease tract evaluation involves consideration of factors that influence the tract's prospects for development such as potential coal markets, transportation availability, geoengineering conditions, surface resources, reclamation potential, water availability, and capacity of the existing mining infrastructure and community facilities.

To assist OTA in conducting this two-tiered evaluation process and to identify the major issues and uncertainties affecting coal development in Utah, OTA convened a Task Force composed of federal, state, and interest group representatives and OTA technical consultants. The OTA Utah Coal Leasing Task Force met for four days in Salt Lake City to review the development prospects of some 123 undeveloped federal coal leases.

Status of Federal Coal Leases in Utah

There are currently 201 federal coal leases in the state of Utah covering some 277,514 acres of federal land and over 3.2 billion tons of recoverable coal reserves. The Utah leases represent over one-third of the 546 outstanding leases and account for roughly 20 percent of the federal coal under lease. Utah also has 25 of the 172 pending preference right lease applications. The Utah PRLA's cover over 75,000 acres of federal land and have over 360 million tons of recoverable coal reserves. The USGS preliminary 1979 production estimates show a total of 6,778,615 tons of coal produced from federal lands in Utah.

Of the 201 federal leases in Utah, 44 leases are included in mining plans approved by USGS, and 34 leases are included in mining plans that are pending approval by USGS. There are no mining plans on file or under active review by USGS for the remaining 123 leases. These 123 undeveloped leases account for about 40 percent of the existing federal coal leases without mining plans. Because most of the known coal resources in Utah are federally owned, these undeveloped leases represent a substantial portion of the potential new coal production in the state over the next decade. New federal leases from the planned 1981 lease sales are not expected to make a significant contribution to coal production until 1987 at the earliest because of the estimated 6 to 8 year development and construction period required for new mines.

Results of OTA's Initial Screening of Undeveloped Lease Blocks

The 123 undeveloped federal coal leases in Utah were divided into 35 lease blocks for analysis. (A lease block consists of all leases held by a

lessee that are contiguous or are sufficiently close to form a compact mineable unit.) The lease blocks were reviewed by using a set of initial screens or threshold criteria that are based on the coal reserves and financial requirements for a typical new Utah underground or surface mine over the next decade. The lease blocks, the threshold criteria, and the results of the initial screening are shown in columns 1-6 of Table A. Of the 35 undeveloped lease blocks, 15 blocks containing a total of 22 leases met all of the threshold criteria. Twenty blocks containing a total of 101 leases did not pass the initial screening. Of the 20 lease blocks that did not meet the characteristics for a viable new mine, only three lease blocks failed solely because of insufficient reserves.

Task Force Classification of Lease Property Characteristics

The Utah Task Force was asked to rate each of the 35 lease blocks according to whether the block represented a favorable, unfavorable, or uncertain property for a potential new coal mine. In rating the property characteristics of each lease tract, the Task Force was encouraged to consider the amount and quality of reserves, geologic and topographic conditions, and potential conflicts with surface resources or uses. Each tract was considered individually without any additional federal or nonfederal reserves. The Task Force identified 14 lease blocks with a total of 100 leases as favorable new mine properties and 21 lease blocks with a total of 23 leases as unfavorable new mine properties. No lease blocks were classified as having uncertain property characteristics. The Task Force classifications of lease property characteristics are shown in column 7 of Table A.

Task Force Classification of Prospects for Development

The Task Force agreed that the prospects for development by 1986 of existing federal leases without mine plans are generally unfavorable. Two lease blocks were identified by the Task Force as likely to be developed by 1986 under certain conditions. Neither of these two lease blocks were classified as favorable mine properties, therefore the two leases were rated as uncertain. The 33 remaining lease blocks were rated as unlikely to be in production by 1986.

For 1991, the prospects for development are somewhat brighter. The Task Force identified one undeveloped lease block that was expected to begin full-scale production by 1991. Eleven more lease blocks with a total of 59 leases were classified as having uncertain development prospects for 1991. These eleven lease blocks are all large tracts of favorable coal reserves that are held by companies that are either utilities or active coal mine operators. Nine of the eleven uncertain blocks are in Central Utah. The other two blocks represent the proposed Alton Strip Mine project in Southern Utah. All of these blocks were classified as favorable mine properties. The Task Force rated the development prospects of the remaining 22 lease blocks as unfavorable. Included in the unfavorable category were the 45 undeveloped leases on the Kaiparowits Plateau in Southern Utah. The Task Force was unanimous in the view that full-scale development on the Plateau would not occur until after 1991, if at all. The Task Force classifications of Development Prospects are shown in columns 8 and 9 of Table A.

Task Force Suggestions for Additional OTA Analysis

The Task Force concluded their discussion of each lease block with a judgment on whether or not the block represented a favorable coal property and whether the block was likely to be developed by 1986 or 1991. In their evaluations, the Task Force did not rank the leases according to their relative merits or their probability of being developed. Each lease block was considered individually. The Task Force identified those lease blocks with most favorable development prospects based on the available information. Several Task Force members observed that it would be difficult to identify which leases would be more likely to be developed without having more information on the production potential and relative mining costs for competing coal properties in the area, i.e. existing and planned mines.

The Task Force suggested that OTA considered several alternative development possibilities for leases that were rated as unfavorable because they could not support an average new 500,000 ton/year mine. These alternatives are: a) acquisition of additional federal or nonfederal reserves on adjacent lands; b) combination with an adjacent active mine through assignment or operating agreements; c) operation of a small mine to serve local needs or the spot market; and d) small scale production on a less than optimal lease in order to meet diligence requirements ("mine to save it").

OTA Review of Task Force Conclusions

Following the Task Force meetings, OTA staff reviewed the lease block classifications and the Task Force suggestions and assembled additional

information on the Utah leases. The purpose of the independent review was to identify and resolve any inconsistencies or uncertainties in the Task Force classifications and to define any general trends or observations that could be drawn from the Task Force discussions. As a result of this review, OTA made its own classification of lease development prospects and divided the leases into four categories for further analysis.

OTA Evaluation of Lease Development Prospects

Based on the Task Force judgments and information assembled by OTA staff and contractors on the characteristics of the undeveloped lease blocks, OTA made an independent evaluation of the development prospects of the undeveloped leases. The results of this review are shown in column 13 of Table A. Briefly, the OTA classifications are as follows:

Favorable Development Prospects: 10 lease blocks/57 leases

This category includes leases that passed all the initial screens, were rated as favorable mine properties by the Task Force, and were classified as having either favorable or uncertain development prospects by the Task Force.

Uncertain Development Prospects: 7 lease blocks/46 leases

This category includes leases that have a possibility of development based on favorable mine property characteristics and special conditions identified by the Task Force. All but three of the leases in this category passed the initial screens. The undeveloped leases on the Kaiparowits Plateau are in this category.

Unfavorable Development Prospects: 18 lease blocks/20 leases

This category includes leases that were rated as unfavorable mine properties and unfavorable development prospects by the Task Force. All but one of the lease blocks failed the initial screening process. All of the small single lease blocks held by individual owners or inactive mining companies are in this category.

The OTA classifications of lease development prospects do not mean that OTA has concluded that these leases will actually produce coal by

1991. Rather, the purpose of these classifications and of the task force discussions is to identify the existing federal lease tracts that could support viable mining operations in the future, those tracts that could sustain a new mine but have substantial uncertainties relating to the conditions that would support development, and those lease tracts that are unfavorable mine properties and are unlikely to be mined. The classifications will be used to determine what additional analysis is required to determine which, if any, of the undeveloped leases can be expected to bring production, how much coal will be produced, and what will be the estimated federal revenues.

The analysis of production and revenues potential of existing federal leases will not be an easy task. OTA has no magic crystal ball and, as the following estimates of available reserves indicate, the amount of "good" coal under lease is so great that luck and shrewd business sense may play a more determinative role in development than the quality, quantity, or mining costs of coal under lease.

With the above caveat in mind, OTA has made some preliminary estimates of the available recoverable coal reserves for each development category. These estimates are based on information provided by the USGS.

The ten lease blocks with favorable development prospects have a total of 744.37 million tons of recoverable coal reserves (494.25 million tons of underground reserves and 250.12 million tons of strippable reserves). Central Utah lease blocks have a total of 472.12 million tons of recoverable reserves; Southern Utah leases have 322.2 million tons. The favorable lease blocks contain about 40 percent of the Utah federal lease reserves that are not in mine plans.

Over one billion tons of recoverable underground coal reserves are contained in the seven lease blocks that were rated as uncertain development prospects. Central Utah reserves represent only 3.2 million tons of this total. The uncertain category includes 55 percent of the undeveloped federal lease reserves in Utah.

The eighteen lease blocks that were classified as unfavorable development prospects contain a total of 66.8 million tons of recoverable underground coal reserves. 24.8 million tons are located in Central Utah; 42 million tons in Southern Utah. This category accounts for 4 percent of the undeveloped lease reserves in Utah.

Assuming a 40 year average mine life, if the favorable lease blocks produced at a rate of 2 1/2% per year of their recoverable reserves, they would produce about 24 million tons/year with 18 million tons from Central Utah production and 6.2 million tons from Southern Utah. It is unlikely, however, that all of this coal could find a market at the Task Force's optimistic projection of 25-30 million tons per year of consumption in 1990 since the undeveloped leases would have to compete with existing and pending mines, nonfederal coal sources, and new federal leases and PRLA's.

Classification of Leases for Further Analysis

The Task Force is only one part of OTA's analysis of existing federal coal leases in Utah. Analysis of the production potential of those leases in approved and pending mining plans is underway. An earlier summary of leases in operating mines will be updated and expanded to include leases in pending plans. OTA also plans to contact some of the lessees to obtain their views on lease development prospects and any additional information

they might wish to provide. With information on all existing federal leases (and PRLA's) and information on the anticipated markets for Utah coal from ongoing contractor studies, OTA will then be in a position to make a more positive determination of the development potential of existing federal leases in Utah and of the expected federal revenues from the leases.

In order to complete the overall analysis of existing federal leases, OTA will conduct some additional analysis of the leases that were reviewed by the Task Force. Fortunately, as a result of the Task Force contributions, this additional study has been reduced somewhat by the identification of those leases with unfavorable development prospects and by the clarification of the major issues and uncertainties about the development prospects of the remaining leases.

OTA has divided the undeveloped Utah leases into four groups according to the additional analysis required to complete OTA's mandated tasks.

Group A - Intensive Analysis of the Development Potential of Favorable
Lease Blocks

The ten lease blocks in Group A have generally favorable property characteristics and were rated as favorable or uncertain development prospects by the Utah Task Force. These 57 undeveloped leases are the most likely candidates for development as new mining operations to serve the expected market, therefore the leases will receive the most intensive follow-up analysis. The objective of this additional analysis will be to evaluate the production potential and competitive status of each tract, including a more detailed review of site specific data on environmental and

engineering conditions and an analysis of estimated mining costs. The production potential of these undeveloped leases will be compared with the competing productive capability of approved and pending mines in reaching a determination of the expected production and revenues from all existing federal leases in Utah.

Group B - Analysis of the Uncertainties Affecting Regional Coal Development
Prospects in Southern Utah

Group B includes the 4 lease blocks on the Kaiparowits Plateau in Southern Utah. These 43 leases have generally favorable property characteristics, but were rated as uncertain or unfavorable development prospects because of the major uncertainties about future markets and transportation availability. The principal focus on the additional analysis effort for these lease blocks will be clarification of the uncertainties identified by OTA and the Task Force. Development of the existing leases on the Kaiparowits Plateau has been called an "all or nothing" proposition. Since a minimum level of around 30 million tons/year will be required to support construction of the necessary transportation systems, development of all the lease blocks on the Plateau, including those already in mining plans, is interrelated. The production potential for the Group B lease blocks will be estimated to support the evaluation of the Kaiparowits leases with pending mining plans and to allow for reclassification of the lease blocks should the uncertainties be resolved before the completion of the OTA study.

Group C - Analysis of Leases with Conditional Development Prospects

Group C includes three single lease blocks that are owned by active

coal developers and which the Task Force found to have good quality coal, a favorable location, but insufficient reserves to support a new mine. According to several Task Force members classification of these leases as unfavorable would be misleading since these leases were not similar to other unfavorable lease blocks because of the favorable ownership and coal quality considerations. OTA has concluded, after its review, that these three tracts are in fact sufficiently different from other unfavorable blocks and are representative of other undeveloped tracts in active areas with potentially available federal and nonfederal reserves. We will, therefore, conduct a limited level of additional research to determine the status of the adjacent coal lands and review the classification of these leases if the lessee actually controls additional reserves that could be combined with the lease block to form a viable mining unit.

Group D - Limited Analysis of Leases with Unfavorable Development Prospects

Group D includes 18 lease blocks with a total of 20 leases that the Task Force classified as unfavorable mine properties and unfavorable development prospects. On review, these classifications remain unchanged. OTA's additional analysis of these leases will be limited. Yearly production streams will not be calculated because the leases are not expected to be mined. Some of the unfavorable leases might, however, be reviewed as part of other analysis tasks--such as, for example, the examination of the potential viability of small mines, or the review of mining plans on approved or pending mines where unfavorable leases are a possible source of additional coal reserves.

Conclusions and Implications of Analysis of Lease Classifications

Some significant, though not surprising, observations emerged from OTA's review of the existing federal leases without mining plans (although they represent only part of the existing leases and PRLA's in Utah):

1. Existing federal leases in Utah with favorable development prospects have over 744 million tons of recoverable coal reserves, however, it is clear even from a rough estimate of their production potential, that few, if any, of these leases will be developed to meet expected Utah coal demand over the next decade unless they displace production from existing or planned mines.

2. Although there is a substantial amount of coal under lease, it is unlikely that leases that are not currently in mine plans will contribute significantly to production by 1986.

3. Several large tracts on existing undeveloped leases could be in full scale production by 1991 if (as is possible) the lease tracts qualify for extensions of diligence requirements until 1991. If diligence requirements are strictly enforced, federal production will shift to new lease areas, including PRLA's. (There is speculation that some of the existing undeveloped leases will be "rolled over" - offered for competitive bid after relinquishment or termination and issued as new leases under the new coal management program.)

4. Many of the old small lease blocks that are held by individuals or small mining companies actually produced coal in the past to serve local markets. It is unlikely that more than one or two of these mines will ever be reopened.

5. The primary reason why the large tracts of good quality coal from federal leases in Utah have not gone into production is lack of demand. The large undeveloped federal lease tracts with favorable property characteristics are held by major mining companies and utilities which apparently have the financial resources and technical capability to develop the leases. Many of these tracts were originally obtained as part of ambitious long-term reserve acquisition strategies in expectation of an expanded market for low sulfur western coal. A leveling off of growth in electricity demand, changes in pollution control requirements for coal fired power plants, and current production overcapacity in the coal industry are among the probable reasons why the incentive to develop these lease tracts has not materialized.

These conclusions are tentative; they will be examined closely as OTA continues its evaluation of existing federal leases and PRLA's in Utah.

TABLE A

SUMMARY OF ANALYSIS OF
UNDEVELOPED FEDERAL COAL LEASES
IN UTAH
MAY 1980

SUMMARY OF ANALYSIS OF UNDEVELOPED FEDERAL COAL LEASES IN UTAH MAY 1980																	
BLANK NUMBER	LESSEE	NUMBER OF LEASES	ACRES	COUNTY	TYPE OF RESERVES - (UNDERGROUND OR SURFACE (U/S OR S))	IS LEASE BLOCK CONTAINS A COMPLET	DOES LEASE BLOCK HAVE AT LEAST 10 MILLION TONS OF RECOVERABLE RESERVES?	NO LEASE BLOCK QUALITY REQUIREMENTS	DOES LESSEE HAVE COAL MINING EXPERIENCE OR FINANCIAL CAPABILITY TO DEVELOP THE LEASE?	DOES LEASE BLOCK PASS ALL INITIAL SCREEN?	TASK FORCE CLASSIFICATION OF PROPERTY CHARACTERISTICS FAVORABLE (+) UNFAVORABLE (-), OR UNCERTAIN (?)	TASK FORCE REVIEW OF LITIGATION OR UNFAVORABLE (-), OR UNCERTAIN (?)	POSSIBLE SMALL MINE	ABANDONED TO ACTIVE MINE	REQUIRES ADDITIONAL RESERVES	RTA CLASSIFICATION OF LEASE PROSPECTS FAVORABLE (+), UNFAVORABLE (-), OR UNCERTAIN (?)	RTA CATEGORY FOR FURTHER ANALYSIS
1	CARDWELL ENERGY BANK	3	276.99	CARDWELL	U	NO	NO	YES	NO	NO	-	NO	NO			-	D
2	EUREKA ENERGY CO. (P&G)	1	320.00	CARDWELL	U	YES	NO	YES	YES	NO	+	NO	NO			?	C
3	KATSER STEEL CORP.	2	4,919.16	CARDWELL	U	YES	YES	YES	YES	YES	+	NO	?			+	A
4	KANAWHA-PICKING COAL & COKE	1	1,052.68	CARDWELL	U	NO	NO	YES	YES	NO	-	NO	NO			-	D
5	WASATCH COAL CO.	1	200.00	CARDWELL	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
6	CARROLL COUNTY COAL CO. (MCKINNEY)	1	411.60	ENERGY	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
7	C.V. & J.O. KIMBROUGH	1	320.00	ENERGY	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
8	CONSOLIDATION COAL & KEMPER COAL CO.	9	18,325.94	ENERGY	U/S	YES	YES	YES	YES	YES	+	NO	?			+	A
9	INTERMOUNTAIN EXPLORATION CO.	1	169.99	ENERGY	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
10A	J. SANDERS EST.	1	80.90	ENERGY	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
10B	J. SANDERS EST.	1	80.90	ENERGY	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
11	KATSER STEEL CORP.	6	8,321.21	ENERGY	U	YES	YES	YES	YES	YES	+	NO	?			+	A
12	L & E WILBERG	1	90.00	ENERGY	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
13	M. MCKINNEY EST.	1	280.00	ENERGY	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
14A	NEVADA ELECTRIC INVESTMENT CO.	2	1,366.71	ENERGY	U	YES	YES	YES	YES	YES	+	NO	?			+	A
14B	NEVADA ELECTRIC INVESTMENT CO.	1	1,000.00	ENERGY	U	YES	YES	YES	YES	YES	+	NO	?			+	A
15A	UTAH POWER & LIGHT CO.	5	2,961.70	ENERGY	U	YES	YES	YES	YES	YES	+	NO	?			+	A
15B	PEABODY COAL CO.	1	80.00	ENERGY	U	YES	NO	YES	YES	NO	-	NO	NO			?	C
16	SMITH HOLLADAY ASSOC.	1	80.00	ENERGY	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
17	SWISHER COAL CO.	1	1,908.66	ENERGY	U	YES	YES	YES	YES	YES	+	NO	NO			+	A
18	C. FULTON & C. DENTON	1	80.00	GARFIELD	U	YES	NO	NO	NO	NO	-	NO	NO			-	D
19A	G. FRANKSON	1	120.00	GARFIELD	U	YES	NO	NO	NO	NO	-	NO	NO			-	D
19B	G. FRANKSON	1	40.00	GARFIELD	U	YES	NO	NO	NO	NO	-	NO	NO			-	D
20	A. & V. RASWISSEN	1	40.00	KANE	U	YES	NO	NO	NO	NO	-	NO	NO			-	D
21	CONSOLIDATION COAL CO.	10	25,533.41	KANE	U	YES	YES	YES	YES	YES	+	NO	NO			?	D
22	EL PASO NATURAL GAS CO.	1	1,440.00	KANE	U	YES	YES	YES	YES	YES	-	NO	NO			-	D
23	KING CAMEL COAL CO.	1	240.00	KANE	U	YES	NO	NO	NO	NO	-	NO	NO			-	D
24	NEVADA ELECTRIC INVESTMENT CO.	8	10,374.48	KANE	S	YES	YES	YES	YES	YES	+	NO	?			+	A
25A	PEABODY COAL CO.	9	15,162.64	KANE	U	YES	YES	YES	YES	YES	+	NO	NO			?	D
25B	PEABODY COAL CO.	3	3,520.00	KANE	U	YES	YES	YES	YES	YES	+	NO	NO			?	D
26	WIND POWER CO. ET AL.	21	40,277.35	KANE	U	YES	YES	YES	YES	YES	-	NO	NO			-	D
27	S. H. WEST	1	960.88	KANE	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
28	UTAH INTERNATIONAL, INC.	20	16,158.22	KANE	S	YES	YES	YES	YES	YES	+	NO	?			+	A
29	COASTAL STATES ENERGY CO.	1	160.00	SEVIER	U	YES	NO	YES	NO	NO	-	NO	NO			-	D
30	ENERGY RESERVES GROUP, INC.	3	5,345.67	SEVIER	U	YES	YES	YES	YES	YES	+	NO	NO			?	C

BACKGROUND ON THE OTA FEDERAL COAL LEASING STUDY

Section 10 of the Federal Coal Leasing Act Amendment of 1976 requires OTA to make an independent evaluation of the more than 500 existing coal leases and 172 pending preference right lease applications (PRLA's) on federal land. OTA was requested to:

1. Analyze all mining activities on federal leases;
2. Determine the present and potential value of the leases;
3. Estimate federal revenues from the leases; and
4. Examine the feasibility of using deep mining technology in leased areas.

In order to accomplish the second and third of these tasks, OTA must determine (a) which of the existing leases and PRLA's will be mined, and (b) how much coal will be produced.

Accordingly, as a first step, OTA must identify which leases or lease blocks can support a viable mining operation under the anticipated mine and market conditions of the next decade. To do this, OTA must acquire sufficient information on the ownership, amount, and quality of the lease reserves, as well as data on geo-engineering, market, environmental and transportation conditions in the lease area.

For those leases that are part of an existing or planned mining operation, OTA can, with the help of experienced technical contractors, examine the mine plans on file with the U.S. Geological Survey and the Office of Surface Mining to obtain the best current information on both the production potential of the lease and the development intentions of the lessee. For those leases on which no mining plans have been submitted

(more than 300 leases, according to a recent announcement by the Department of the Interior), there is no such readily available compilation of the lease characteristics and the lessee's development proposals. Because the information required must be obtained from many alternative sources, evaluating the development potential of those leases that are not included in mining plans is one of the most difficult tasks OTA faces in completing its mandated study.

OTA TASK FORCES

To assist OTA in identifying those leases with favorable prospects for development and to identify the conditions or uncertainties that might influence that development, OTA convened a task force in Utah. (Additional task forces will be convened in other western coal states as required.) The task force brought together a group of experienced technical people who are familiar with local conditions to obtain their informed opinions about the factors that affect the overall prospects for development of the non-producing leases in Utah.

The Utah task force met in Salt Lake City, on February 25-29, 1980. The federal agencies regulating mining activities were represented at the task force by technical personnel from the Bureau of Land Management (BLM), the U.S. Geological Survey (USGS), and the Office of Surface Mining (OSM). State government participants included representatives of the Energy Committee of the Utah State Legislature, the Utah State Geological and Mineral Survey, the Utah Department of Transportation, and the Utah Department of Natural Resources, Division of Oil and Gas. The government participants were joined by coal industry and environmental group representatives and by OTA consultants. A list of participants is appendicized.

The Task Force operated under a format and agenda proposed by OTA, with modifications suggested by the task force. Members were given summary information on the undeveloped lease blocks, including the results of OTA's initial identification of lease tracts that did not meet minimum threshold criteria for viable mining operations. The task force participants

reviewed the characteristics of each federally leased tract and provided their opinions on the development prospects of the tract and their judgments on whether or not the tract would be in production by 1986 or 1991. Each lease tract was rated according to its likelihood of development: favorable, unfavorable, or uncertain. The task force was not expected to (1) answer complex questions that required extensive background research, or (2) to provide all the quantitative data needed to evaluate the leases. However, based on their best professional judgement and knowledge of local conditions, members were asked to identify the overall incentives and disincentives for or against development of the undeveloped lease blocks. The Task Force classifications, as supplemented by OTA's independent analysis, will contribute to completion of the assessment of lease development potential, and to identification of major issues and uncertainties affecting federal coal development in Utah.

Development Status of Existing Federal Coal Leases in Utah

According to information obtained from the Bureau of Land Management, there are currently 201 federal coal leases and 25 pending preference right lease applications in the State of Utah. The 201 leases cover over 277 thousand acres of federal land and include over 3 billion tons of recoverable coal reserves. Utah's 201 leases represent over one-third of the 546 existing federal coal leases. (Table 1 shows the distribution of existing federal coal leases by state; Table 2 shows the distribution of Federal coal leases in Utah.)

To determine which leases would be reviewed by the task force, OTA checked the development status of existing leases with the USGS mining supervisor in Salt Lake City. Of the 201 existing coal leases, 43 leases are included in approved mining plans. In 1979, the USGS reported that 6,778,615 tons of coal were produced from Federal coal leases in Utah. Production was reported on 27 leases. Another 35 existing federal leases are covered by pending mining plans under review by the USGS. Table 3 shows the current mine plan status of existing federal leases in Utah.

The 123 leases which did not have an approved or substantially complete proposed mining plan on file with USGS were classified as "undeveloped." The term "undeveloped" as used in this study means that on the basis of mining plans on file with USGS in Salt Lake City the lessee has not yet sufficiently explored or developed the lease to submit a final proposed mine design. Task Force members were asked to provide additional information on any recent lessee development activities or intentions as evidence of a tract's development potential.

Some of these "undeveloped" leases are part of conceptual mine plans, i.e. informal mine plan proposals provided to the Department of the Interior for inclusion in regional coal EIS's. Other undeveloped leases are included in proposed mine plans filed with OSM, Region V in Denver, but are not part of any formal plans actively under review by USGS.

Several leases for which apparently incomplete or obsolete plans are on file with USGS were added to the "undeveloped" category for task force review because the mine plan contained insufficient information with which to assess development potential. The acreage and amount of reserves of existing federal leases in Utah are almost evenly distributed between Central and Southern Utah. However, Southern Utah contains no leases in approved mine plans; 78 of the total 123 undeveloped leases in the state are located in Southern Utah. (See Table 4.)

Those federal leases that are contained in approved or pending mine plans are being reviewed by OTA technical contractors. The contractors will summarize the lessee's operating and production plans, as described in the mine plans, and analyze the development proposals. The contractor will identify any conditions that might change the lessee's projected production levels, such as inability to secure a contract. The contractor will also analyze the likely production potential of any undeveloped lease blocks that are identified as having generally favorable development prospects after task force & OTA review. The results of the technical contractor study will be used to assess the development potential of all federal leases and the anticipated federal revenues from lease rentals and royalties.

TABLE 1
SURFACE ACREAGE OF LEASES, BY STATE AND BY SURFACE
OWNERSHIP: SEPTEMBER 30, 1979

State	Number of Leases	Total Acres
Total	546	779,401
Alabama	1	2,388
Alaska	4	2,593
California	1	80
Colorado	123	125,640
Kentucky	3	2,225
Montana	19	37,224
New Mexico	28	40,905
North Dakota	17	15,836
Oklahoma	46	74,141
Oregon	3	5,403
Pennsylvania	2	80
Utah	201	277,514
Washington	2	521
Wyoming	96	214,849

NOTE: Details may not add to total due to rounding.

SOURCE: U.S. Department of the Interior, Bureau of Land Management,
Office of Coal Management, Automated Coal Lease Data System,
September 30, 1979.

TABLE 2
NUMBER OF LEASES, ACREAGE, AND RECOVERABLE RESERVES OF FEDERAL LEASES
IN UTAH BY MINE PLAN STATUS

Mine Plan Status	Number of Leases	Total Acreage	Total In-Place Reserves	Recoverable Strippable Reserves	Recoverable Deep Reserves
Approved	43	47,462	1337	-0-	633
Pending	35	63,588	2100	17	795
<u>Undeveloped</u>	<u>123</u>	<u>166,066</u>	<u>4293</u>	<u>250</u>	<u>1571</u>
TOTAL	201	277,114	7730	267	2998

TABLE 3

Development Status of Existing Federal Coal Leases in Utah

<u>Approved Mining Plans</u>		<u>Pending Mining Plans</u>		<u>No of Mining Plans filed with USGS</u>	
Lessee:	Leases	Lessee:	Leases	Lessee:	Leases
California Portland Cement (Soldier Canyon)	1	AMCA Coal Leasing	3	Carbon Emery Bank	3
Coastal States Energy Co. & Equip. Rental Service Co. (Convulsion Canyon)	4	Armeda McKinnon (Skyline)	1	Eureka Energy Co.	1
Franklin Real Estate (Braztah)	10	Eureka Energy Co. (Sage Pt.)	3	Kaiser Steel Corp.	8
Kaiser Steel (Sunnyside)	2	Equipment Rental Svc. (Sage Pt.)	2	Kanawha-Hocking C&C	1
M. McKinnon Est. (Belina No. 1)	1	Kanawha-Hocking C&C (O'Connor)	1	Wasatch Coal Co. (Blue Blaze)	1
Plateau Mining (Star Point)	3	Kanawha-Hocking C&C (Skyline)	1	Carroll County Coal Co.	1
Swisher Coal Co. (Gordon Creek #2)	1	M. McKinnon Estate (Skyline)	2	Chas. & J.O. Kingston	1
U.S. Steel Corp. (Geneva)	2	U.S. Steel Corp (B Canyon)	1	Consolidation Coal Co. & Kemmerer Coal Co.	9
Cooperative Security Corp. (Deer Creek - Wilberg)	3	Consolidated Coal & Kemmerer Coal Cos. (Emery Deep)	1	Intermountain Exploration (Huntington Canyon #5)	1
John L. Bell (Trail Mtn)	1	El Paso Natural Gas (Red)	14	J. Sanders Est.	2
Kanawha-Hocking C&C (Belina)	1	El Paso Natural Gas (Blue)	1	Lloyd & Eliza Wilberg	1
M. McKinnon Est. (Deer Creek etc)	3	Hiko Bell Mining & Oil Co. (So. Nipple Butte)	3	M. McKinnon Est.	1
Swisher Coal Co. (Swisher #4)	1	Mountain States Resources Energy Reserves Group	1	Nevada Elec. Investment	3
Swisher Coal Co. (Huntington Can. 4)	1	(Accord Lake)	1	Peabody Coal Co.	13
U.S. Fuel (King)	3	Total	35	Utah Power & Light (Peabody)	5
Utah Power & Light (Desbeedove)	3			Smith-Holladay Assoc.	1
Utah Power & Light (Deer Creek etc)	3			Swisher Coal Co. (Clear Creek)	1
Total	43			C. Fulton & C. Denton (Shakespeare)	1
				Geo. Frandsen	2
				A&V Rasmussen	1
				Consolidation Coal Co.	10
				El Paso Natural Gas	1
				King Cannel Coal Co.	1
				Nevada Elec. Investment (Alton)	8
				Mono Power, et al. (Kaiparowits)	21
				S.H. West	1
				Utah International Inc. (Alton)	20
				Coastal States Energy Co.	1
				Energy Reserves Group Inc. (Rock Canyon)	3
				Total	123

(Mine names are shown in parentheses)

Source: U.S. Department of the Interior
Automated Coal Lease Data System

TABLE 4

NUMBER OF LEASES, ACREAGE, AND NINE PLAN STATUS OF FEDERAL LEASES IN UTAH,

BY COUNTY

Mine Plan Status	Central Utah			Southern Utah			Total Leases/ Acreage
	Carbon Leases/Acreage	Emery Leases/Acreage	Carbon/Emery Leases/Acreage	Sevier Leases/Acreage	Garfield Leases/Acreage	Kane Leases/Acreage	
Approved	13 (14,918)	14 (12,974)	12 (14,018)	4 (5552)	0	0	43 (47,462)
Pending	12 (16,308)	1 (720)	2 (2613)	2 (11,328)	0	18 (32,619)	35 (63,588)
Undeveloped	8 (6,849)	33 (35,764)	0 (35,764)	4 (5506)	3 (240)	75 (117,707)	123 (166,066)
Total	33 (38,074)	48 (49,457)	14 (16,631)	10 (22,386)	3 (240)	93 (150,326)	201 (277,114)

Evaluation of the Development Prospects for Federal Leases Without Mine Plans

When a prospective developer evaluates a potential coal mine property, the developer's initial consideration is whether or not the property has sufficient recoverable reserves with the required coal quality characteristics to sustain a viable mining operation. After determining if the property has an adequate reserves base, the developer will consider other factors such as transportation, environmental and community conditions that affect the costs, timing, and permitting requirements for opening a mine. Those leases which, after this review, are found to have few if any, legal, engineering, environmental or other constraints on development and which alone or in combination with other lands controlled by the same lessee have sufficient reserves to sustain a viable mine can be said to have favorable development prospects and would then be given a more exhaustive examination as a potential investment.

OTA has adopted a process for reviewing federal leases without mine plans that approximates the approach that a prudent developer would use in evaluating a property. The first step in the OTA evaluation process compares the reserves characteristics of the undeveloped leases with a profile of a viable new mining property to identify those leases that meet the minimum mine design requirements. Viable mine profiles for an average new mine were developed for each coal basin with Federal leases. All adjoining leases held by the same party were evaluated as a single block. In the second step in the evaluation process, other factors that affect the tract's development prospects are considered. These other factors include the potential markets, geographic location, status of adjacent lands,

surface resources, transportation availability, community infrastructure, and environmental impacts. The results of this review are used in combination with the initial screening process to divide existing undeveloped leases into three categories:

Leases with Favorable Development Prospects - The lease or lease block has favorable development characteristics overall; the lease(s) meet the threshold criteria for a viable mining property; there are no major* technical or permitting problems or uncertainties associated with lease development.

Leases with Uncertain Development Prospects - The lease or lease block has generally uncertain development prospects because additional information or analysis is required to evaluate development prospects or development is contingent on conditions that are independent of the characteristics of the property.

Leases with Unfavorable Development Prospects - The lease or lease block has generally unfavorable or difficult development prospects because a) the lease(s) do not meet the threshold criteria for a viable mining property and/or b) there are major* technical or permitting problems or uncertainties associated with lease development.

It is expected that leases in the favorable and uncertain categories are more likely to be developed than those that are classified as unfavorable, therefore additional analysis will focus on leases in the first two categories. The state task forces contribute to this two step evaluation process: the task forces review the mine profiles used in the initial screening process to confirm that the models generally reflect conditions in particular coal basins; and review initial screening results to assure that the lease ownership and coal reserves information is reasonably correct. Task force members then draw on their local experience to assess the influence of other factors on the development prospects of

*A major technical or permitting problem or uncertainty is one that is so substantial that a prudent mining firm would not make a significant commitment of resources to development under existing conditions.

TABLE 5

SUMMARY OF CSMRI CONVENTIONAL COAL MINE MODELS FOR UTAH COAL FIELDS

FACTOR	UNITA REGION		SOUTHWESTERN UTAH REGION		
	BOOK CLIFFS FIELD	WASATCH PLATEAU FIELD	EMERY FIELD	KAIPAROWITS FIELD	ALTON FIELD
Coal Rank	HVBC-HVBB	HVBC-HVBB	B	SB-HVBA	SB
Moisture (%)	4-7%	5-7%	7-8%	10-20%	17%
Volatile Matter (%)	38-45%	41-42%	38-41%	43-45%	33%
Ash (%)	6-7%	6-7%	9-20%	8-14%	9%
Sulfur (%)	0.4-1.0%	0.6%	0.5-2.5%	0.8-1.3%	1.1%
BTU/lb.	12,500-13,000	12,200-12,700	11,400-12,300	11,200-12,400	9,600
Coal Thickness (ft.)	4-14	4-24	4-12	3-25	12-14
Minimum Leasehold	3000-4000 acres	200-3000 acres	2500 acres	5000-10,000 acres	8000-10,000 acres
Minimum Recoverable Reserves (Mt)	10-30	10-30	20-30	70-150	100-200
Mine Life (Yrs.)	25-30	20-30	25-30	25-30	25
Design Capacity (Mt)	0.2-1.0+	0.2-1.0+	0.5-1.0	0.5-1.0	10-11
Common Technology	U:Conv, LW	U:Conv	U:Conv, S(?)	U:Conv, LW(?)	S:Conv
Likely Markets	S-EG (UT, Midwest)	S-EG (UT-Midwest)	S-EG (UT-Mid- west, South?)	S-EG (Region)	S-EG (Region)

L=Lignite; SB=Subbituminous; B=Bituminous; HVB=High-Volatile Bituminous (C,B,A); MVB=Medium-Volatile Bituminous; LVB=Low Volatile Bituminous
 S=Surface; U=Underground
 Conv=Conventional; LW=Longwall
 S-EG=Stream-Electric Generation

Table 6

INITIAL SCREENING PROCESS FOR UNDEVELOPED FEDERAL COAL LEASES

Criteria	Rationale	References	Information Sources
1. All leases in the tract are held by the same owner.	Coal operators form mining units out of more than one lease - leases held by the same owner in the same area are presumed to have been acquired for purposes of development. Regulations require that all leases in a logical mining unit (LMU) be under the effective control of a single operator.	DOI Coal Leasing Regulations 43 CFR 3400.0-5(cc) 43 CFR 3475.5	Lease lists with ownership and location obtained from State BLM Offices and DOI coal lease data system (ACLDS)
2. The lease tract forms a compact and contiguous unit.	Mining units must be sufficiently compact and contiguous to allow for economy of operation and orderly sequence of mining. Regulations require that all leases in an LMU be contiguous - i.e. having at least one point in common.	DOI Coal Leasing Regulations 43 CFR 3400.0-5(cc) 43 CFR 3400.0-5(k)	Official public land records - coal plat maps from State BLM office and coal lease maps at various scales from USGS, BLM and state agencies.
3. The Lease tract has sufficient recoverable reserves to support an average new mine e.g. 500,000 tons/year surface or underground mine with 30 year life (15 million tons) for steam coal production; 200,000 tons/year with 30 year life (6 million tons) for industrial coal production.	Review of planned new mines indicates trend towards steam coal mines of 500,000+ tons/year; projected mine life ranges from 20 to 40 years - average of 30 years required to amortize investment/recover costs; Representative size of industrial coal operation is 200,000 tons/year.	CSMRI mine survey and profile of typical new mine requirements; consultations with USGS, State geological survey, and coal industry sources.	Recoverable and in-place coal reserves estimates from USGS and from independent sources such as EIS's, press releases, and OTA staff/consultant calculations.
4. Coal reserves meet minimum coal quality standards for expected end use. (steam coal) • at least 11,000 BTU/lb for underground reserves • at least 8,000 BTU/lb for surface reserves • Sulfur content of 1.5% or less • Ash content of 15% or less	Coal quality characteristics reflect lower limits of BTU/lb, % sulfur, and % ash to meet expected demand for Utah coal over next decade.	CSMRI mine survey and profiles of typical new mine requirements; consultations with USGS, State geological survey, and coal industry sources.	Coal quality information from DOI coal lease data system plus supplementary information from EIS's and F.E.R.C. report summaries published in <u>Coal Outlook</u> .

Criteria	Rationale	Reference	Information Sources
5. Geologic characteristics of the coal reserves and topographic conditions do not impose restrictions on mine design or coal recovery. e.g., Underground seams are at least 48" thick and coal beds dip at less than 15°; surface reserves are under 150 feet of overburden or less.	Geo-engineering requirements for mine design and equipment make mining under certain conditions difficult and costly and limit recoverability. Conditions in Utah were identified based on consultation with USGS and State Geologic Survey concerning characteristics of Utah coal basins, equipment requirements, and current mining practices.	CSMRI mine survey; UGMS Utah Coal Monographs; consultations with USGS, UGMS and industry sources.	Geologic information from DOI automated coal data system; UGMS Utah Coal Monographs.
6. Lessee has financial capability and/or mining experience to develop the tract. e.g., Demonstrated ability or financial resources to support initial capital costs of \$20-40 million.**	Initial capital costs to open a new 500,000 ton/year deep mine are estimated at \$23 million (1977 dollars); surface mine capital requirements are estimated to be \$30 million for a large mine (5 MTY). Lessee must be able to obtain financing for mine development - costs exclude lease acquisition.	A. Cornett, Colorado Mining Assoc. 1976 Mining Yearbook; DOE Energy Information Admin., Economic Analysis of Coal Mining Costs for Underground and Strip Operations; consultations with USGS, UGMS, and industry sources.	OTA study of federal leaseholders including information on individual and corporate lessees, current and past mining experience, and assets based on lessee disclosure statements in lease records, state corporation commissions, industry directories, direct interviews with lessees and coal industry sources, and investment services.
			Ownership information on file with BLM extracted and summarized by OTA contractor and supplemented by independent research in financial services and direct contacts with lessees and state agencies' public records.

** This criteria provides a rough measure of the financial capability required for mine development. Underground coal mine developments are estimated at \$40/annual ton for underground mines, and in the West, \$18-20 annual ton. Large capital costs make mining developments for small lessees extremely difficult, unless small lump coal mines are developed. (Source: A. Cornett, Colorado Mining Association 1976 Mining Yearbook). Capital requirements for 500,000 ton per year operation is \$20,000,000 for underground mine on an annual ton basis are postulated; capital expenditures based on 15 year mine life (after A. Cornett) is \$37,000,000 for deep mines, and about the same for surface mines. A \$20,000,000 to \$40,000,000 capitalization estimate was used; obviously, ingenuity, opportunities for outside capital, and smaller mine developments would require less.

the lease tracts. Tract characteristics are appraised and a judgment is made about whether the tract would be in production under normal operating conditions by the 1986 or 1991 diligence dates. The information and opinions supplied by the task force are used -- with other information acquired by OTA -- to determine the development potential of each tract.

Development of Threshold Criteria for Viable New Coal Mine Properties

OTA developed a set of technical criteria or "screens" that describe the minimum or threshold requirements of a typical new coal mine in each coal basin in Utah. Typical mine profiles for the 1980-1990 timeframe were developed for both surface and underground mines. These screens use geological, ownership and other lease-specific information to approximate the initial evaluation process that a prospective developer might use in determining whether a particular tract has favorable development characteristics and merits a more exhaustive examination.

These screens are based on OTA workshops, literature review, and models of typical Utah surface and underground mines prepared for OTA by the Colorado School of Mines Research Institute (CSMRI) and on consultations with USGS and Utah state officials and with OTA project advisory panel members. (The CSMRI mine models are summarized in Table 5). OTA used these technical screens to make a preliminary classification of the lease blocks in preparation for task force discussions.

OTA used the following requirements that define the property characteristics for a typical new surface or underground mine in Utah for

the next decade to identify favorable lease tracts:

1. All leases in the tract are held by the same owner.
2. The lease tract forms a compact and contiguous geographic unit;
3. The lease tract has sufficient recoverable reserves to support a surface or underground mine with the capacity to produce 500,000 tons/year of steam coal for 30 years (15 million tons of recoverable reserves). (The suggested reserves requirements for a mine producing coal for industrial consumption are 6 million tons of reserves or the capacity of producing 200,000 tons/year for 30 years.)
4. The coal reserves meet these coal quality standards:

at least 11,000 BTU/lb for deep mines or at least 8,000 BTU/lb for surface mines;

less than 1.5% sulfur content;

less than 15% ash content.

(Minimum quality standards for industrial use coal from Utah coal fields are presumed to be similar)

5. The Geologic Characteristics of the Coal Reserves and Topographic conditions do not impose unusual restrictions on mine design or coal recovery.

- o The coal seams are at least 48 inches thick (for underground reserves).
- o The seam dip is less than 15°.
- o The overburden thickness is less than 150 feet for strip reserves.

6. The lessee has the coal mining experience and financial capability to develop the lease (the estimated cost of developing a typical new mine - excluding lease acquisition cost - is \$20-40 million).

Table 6 summarizes the screens, supporting rationale and information used in applying the screens to the Utah lease tracts.

The 123 undeveloped federal leases were reviewed by OTA staff using these screens to determine whether they met the above threshold criteria. In making this initial review, OTA used information from the Department of the Interior's automated coal lease data system (ACLDS), from regional coal

environmental statements and other published sources, and information from consultations with federal and state agency officials and OTA contractors. Estimates of inplace and recoverable reserves information was obtained from the US Geological Survey. These USGS reserves estimates have been subject to criticism by GAO and others because many of the estimates were extremely conservative and not made in accordance with the standard procedures in USGS Pub. 1450 B. However, these figures appear to be the best information currently available for leases without mining plans.

Application of Initial Screening Process for Undeveloped Federal Coal Leases in Utah

Only the 123 federal leases without mine plans were evaluated during the initial screening and subsequent task force discussions. Federal leases in approved or pending mining plans, federal preference right lease applications, state coal leases and private coal lands were not included in the lease tracts evaluated by OTA. There are two reasons for excluding coal that is not under a Federal lease: 1) limiting the review to existing leases allows OTA's analysis to respond to the recurring question of how many of the existing undeveloped federal coal leases can actually support an independent viable mining operation under current conditions; and 2) because of time and resource constraints the information was not readily available on the status of non-federal coal and the availability of additional federal coal from PRLA's and new leases. (OTA will obtain information on the status and ownership of adjacent properties where required to complete analysis of the development potential of existing leases.)

All Leases in the Tract are held by the same owner

All leases held by the same party and forming a compact and contiguous geographic unit were combined into a single lease block so that the maximum available reserves would be allocated to the block for the initial screening and the lessee's presumed intention of acquiring the neighboring tracts for development would be reflected in the analysis. Using a lease by lease approach might result in an inaccurate appraisal of a multi-lease block assembled by the lessee for consolidation into a single viable mining unit. The 123 undeveloped leases were initially divided into 30 blocks based on information from the State BLM office on current ownership (lessee of record) and general location. Leases held by the same party and located in the same or adjacent townships were tentatively grouped into a single block. The lease blocks are listed in Table 7.

The lease tract forms a compact and contiguous unit

Mining units are generally designed to consist of sufficiently compact and contiguous areas to allow for economy of operation and an orderly sequence of mining. Leases in the tract should form an unbroken and continuous unit so that operations can efficiently follow the seams to be mined. Intervening areas not under the control of the operator impose design restrictions and reduce access to and recoverability of coal in the leased area in order to leave the required buffer zone surrounding the unleased area. For this reason, developers will usually seek to obtain the rights to all the properties within the proposed mining area. The 30 initial lease blocks were reviewed using the BLM coal plat maps showing the exact location of all leases in order to determine whether the blocks did in fact consist of compact and contiguous units. When the lease boundaries

TABLE 7.

BLOCK NUMBER	LESSEE	NUMBER OF LEASES	ACRES	COUNTY
1	CARBON EMERY BANK	3	276.90	CARBON
2	EUREKA ENERGY CO. (PG&E)	1	320.00	CARBON
3	KAISER STEEL CORP.	2	4,919.16	CARBON
4	KANAWHA-HOCKING COAL & COKE	1	1,052.68	CARBON
5	WASATCH COAL CO.	1	230.00	CARBON
6	CARROL COUNTY COAL CO. (McKINNON)	1	411.60	EMERY
7	C.W. & J.O. KINGSTON	1	120.00	EMERY
8	CONSOLIDATION COAL & KEMMERER COAL CO.	9	18,025.94	EMERY
9	INTERMOUNTAIN EXPLORATION CO.	1	160.00	EMERY
10A	J. SANDERS EST.	1	80.00	EMERY
10B	J. SANDERS EST.	1	80.00	EMERY
11	KAISER STEEL CORP.	6	8,321.21	EMERY
12	L & E WILBERG	1	80.00	EMERY
13	M. McKINNON EST.	1	280.00	EMERY
14A	NEVADA ELECTRIC INVESTMENT CO.	2	1,366.71	EMERY
14B	NEVADA ELECTRIC INVESTMENT CO.	1	1,800.00	EMERY
15A	UTAH POWER & LIGHT CO.	5	2,961.00	EMERY
15B	PEABODY COAL CO.	1	80.00	EMERY
16	SMITH HOLLADAY ASSOC.	1	80.00	EMERY
17	SWISHER COAL CO.	1	1,908.66	EMERY
18	C. FULTON & C. DENTON	1	80.00	GARFIELD
19A	G. FRANDSEN	1	120.00	GARFIELD
19B	G. FRANDSEN	1	40.00	GARFIELD
20	A. & V. RASMUSSEN	1	40.00	KANE
21	CONSOLIDATION COAL CO.	10	25,533.41	KANE
22	EL PASO NATURAL GAS CO.	1	1,440.00	KANE
23	KING CANNEL COAL CO.	1	240.00	KANE
24	NEVADA ELECTRIC INVESTMENT CO.	8	10,374.48	KANE
25A	PEABODY COAL CO.	9	19,162.64	KANE
25B	PEABODY COAL CO.	3	3,520.00	KANE
26	MONO POWER CO. ET AL	21	40,277.35	KANE
27	S. H. WEST	1	960.88	KANE
28	UTAH INTERNATIONAL, INC.	20	16,158.22	KANE
29	COASTAL STATES ENERGY CO.	1	160.00	SEVIER
30	ENERGY RESERVES GROUP, INC.	3	5,345.67	SEVIER

were examined using the large scale maps, five lease blocks were found to be noncontiguous and sufficiently distant so that they would not be considered as a single mining unit (e.g. separated by more than one section and not connected by intervening state or fee land). These five blocks were further subdivided into ten separate blocks. Two lease blocks were found to be composed of noncontiguous units, however these areas did not form separate mineable blocks. These blocks were not subdivided.

There were 35 lease blocks after conducting this initial screening and division of leases into appropriate tracts for analysis. There are 21 single lease blocks, ranging in size from 40 to 1800 acres. The multi-lease tracts include from 2 to 21 leases and range in total size from 276 to over 40,000 acres.

The lease block has sufficient recoverable reserves to support an average new mine

The recoverable reserves screen was established to be representative of a typical new mine to be opened in the Utah coal fields during the period 1980-1990. The reserves requirements for an average new mine were based on an OTA review of the characteristics of existing and planned surface and underground coal mines in Utah, the CSMRI mine profile survey, and consultations with the U.S. Geological Survey, the state geological survey and industry sources. A representative new underground or surface mine for steam coal is expected to have a design capacity of 500,000 tons/year over a 30 year mine life, thus requiring a minimum of 15 million tons of recoverable reserves. A typical new industrial coal mine is expected to require an annual production capacity of 200,000 tons year for 30 years or 6 million tons of recoverable reserves. The thirty year mine

life was selected based on the projected life for new and proposed mines ranging from 23-38 years and estimates of between 20 and 30 years of operation for the time required to recover the initial capital investment.

The reserves screen does not provide for the requirements for a small mine (e.g., typically defined as a mine producing 100,000 tons/year or less). Utah has a history of relatively successful small mining operations that served the spot market or a local lump coal market, however the opportunities for such enterprises in the future are not encouraging given the shift to captive production by the area's major coal consumers - the electric utilities. The Utah task force and others provided several estimates of what a typical small mine would produce - these estimates ranged from 5,000 tons/year for a mine in south central Utah to 100,000 tons/year for a mine in the central Utah coal fields. The suggested mine life for such an operation ranged from 10 to 30 years. Under such conditions, the recoverable reserves base for a small mine could range from 50,000 tons to 3 million tons. Because of the wide variation in sizes for small mining operations, no profile of a typical small mine was developed to be used as a screening tool. OTA does, however, plan to examine the outlook for small mining operations in the west as part of its additional analysis.

When the undeveloped lease tracts were reviewed using the minimum recoverable reserves criteria of 15 million tons, 15 of the lease blocks passed the screen, 20 did not. Three single lease blocks passed the reserves test. Only one multiple lease block containing 276 acres did not have the required reserves. Out of a total of 123 leases, 100 leases were included in blocks that survived the reserves screen. The 20 blocks that

did not met the reserves test contained 23 leases and a roughly estimated 4.5 million tons of recoverable coal reserves (all deep coal).

The 14 lease blocks that passed the reserves test contain a total of 1,776.36 million tons of recoverable reserves including 250.12 million tons of surface mineable coal and 1,526.24 million tons of underground reserves. Using the lower minimum reserves requirements of 6 million tons for an industrial coal mine, only two additional tracts met the reserves requirements - one 960 acres lease located on the Kaiparowits Plateau and one in Central Utah with 411 acres. Neither of these two lease blocks is considered to be a likely candidate for development as an industrial coal source.

Of course, a lessee could acquire additional coal reserves by obtaining adjoining private or state coal lands, or by combining the lease with a new or existing federal lease to create a unit with sufficient reserves to sustain a mine. In applying this reserves screen, OTA did not include nonfederal coal sources or the availability of additional federal coal lands. As part of more detailed evaluation of several small lease tracts, the status of adjacent lands will be ascertained and a reserves screen could then be reapplied to determine if additional available reserves under the control of the lessee would make the property viable.

The Coal Reserves Meet the Minimum Coal Quality Standards for End use

Minimum coal quality standards for Utah coal were established based on the coal quality requirements of the existing market and long term contract specifications. The coal quality standards were set according to what are the current minimum standards for Utah steam coal in area markets. Coal falling below these quality standards would be difficult to sell outside local markets. The values selected are reasonably representative of coal being sold and allow for coal with relatively higher sulfur or ash content to be sold for blending with better quality coals. These values were selected in consultation with the USGS, the UGMS and industry sources. Coal quality standards for industrial or metallurgical coal use were assumed to be similar to those for steam coal.

The minimum required heat value of the coal was set at 11,000 BTU/lb for underground mining and at 8,000 BTU/lb for strip mining. Most coal basins in Utah exceed these values.

The maximum sulfur content of 1.5% is relatively low compared to the sulfur content of coals being mined elsewhere, however it is representative of coal being mined and sold in Utah. In fact, much of coal currently being mined in Utah is considerably lower in sulfur content.

The maximum ash content was set at 15%. Coal with Ash content greater than 15% can require additional washing and special boiler designs. The nature and quantity of ash in coal is important to the design and operation of coal burning facilities because -- for example -- it influences the operating efficiency of coal-fired combustion systems. Ash content is therefore an important consideration in the marketability of a given lease

tract. For the coal producer, coals with high ash content require extensive preparation and waste handling that add to production costs.

When the coal quality characteristics of the existing leases were reviewed, 30 of the 35 blocks met the threshold criteria. All tracts in central Utah satisfied the coal quality requirements although some leases in southern part of the region (Emery and Sevier counties) have coal seams with highly variable sulfur content. The five lease blocks that did not meet the minimum coal quality criteria were generally small tracts in Southern Utah that had supported past mining operations to serve local needs. The relatively lower BTU value and higher sulfur and ash content of these coals compared to other coals in Utah were not a barrier to local use because of the locational advantage. According to the Utah task force, coal quality is not expected to be a disadvantage for any future development to serve a small local market.

Over 1.8 billion tons of recoverable coal reserves on existing undeveloped federal leases met the minimum coal quality criteria, while only 4.39 million tons of recoverable reserves were contained in the 5 leases tracts did not satisfy the minimum coal quality criteria.

The Geologic Characteristics of the coal reserves and the topographic conditions do not impose unusual restrictions on mine design or coal recovery:

Even though a lease block may have a sufficient amount of recoverable reserves with the required coal quality to sustain an independent mining operation, geologic and topographic conditions on the lease tract may make recovery of these reserves more difficult or more costly than on competing

tracts. In some cases, the limitations imposed by geologic conditions, such as seam thickness, have already been included in the reserves calculations. For example, in Utah, coal seams less than 48 inches thick are not currently considered as recoverable and therefore are not included in the estimates of recoverable underground reserves. (Multiple coal seams less than an aggregate thickness of 48 inches are rarely surface mined in Utah.) Geologic conditions such as seam thickness, depth of overburden, and seam dip must be considered in mine design because these conditions often determine the type of mining and equipment to be used. Topographic conditions, such as steep slopes, high cliffs or lack of surface outcrops also are considerations that can determine mining method, equipment choices and coal recoverability. In Utah, the following geologic conditions that limit mineability were identified:

- o Seam thickness of less than 48 inches;
- o Seam dip of greater than 15°;
- o Overburden thickness of greater than 150 feet for surface mining.

For the undeveloped leases in Utah, these conditions were not found to be a major consideration. No lease blocks were classified as "unmineable". Some seams of less than 48" were found to have been excluded from recoverable reserves estimates, however, in those cases, the leases included other mineable seams. Geologic and topographic conditions are expected to be important considerations in other coal basins, such as the Green River - Hams Fork region, where steeply dipping beds and overburden thickness become more determinative of mineability of the reserves.)

The Lessee has the financial capability or coal mining experience to develop the lease

The final standard in the initial screening of the 35 undeveloped lease blocks was a determination of whether the lessee could reasonably be expected to develop the lease block as an average new mine under the expected conditions in the coming decade. The initial capital costs required to open a new 500,000 ton per year underground or surface mine in Utah, exclusive of lease acquisition costs, is expected to range between 20 and 40 million dollars. In order for the lease to be developed, the lessee must be able to obtain the financing required for the exploratory work, mine design, construction, equipment and supporting facilities.

As a rough measure of whether the lessee has the capacity to develop the lease, OTA assumed that a lessee with other active coal mining operations has demonstrated the ability to develop a lease under existing conditions; Lessees that are large corporations or utilities were generally presumed to be capable of developing the lease. Information on the ownership of the leases was obtained by OTA contractor James Cannon from a survey of lease records, assignment histories, lessee disclosure statements, financial reporting services, industry directories, and direct interviews with lessees and persons familiar with the history of the Utah coal industry. Only the financial capability and mining experience of the current owner of record were considered. To allow a more accurate assessment of the lessee's true financial status, ownership of leases held by land holding subsidiaries and other business entities were attributed to the controlling party where such information was available (e.g., Eureka Energy Company leases were attributed to the parent corporation, Pacific Gas & Electric Company). In most instances, sufficient information was on lessee's mining experience and financial resources available to make a determination about the lessee's capability to develop the lease. OTA did

not assume that assignments or operating agreements would be executed by a lessee to allow development of the lease by an adjacent coal operator, if in fact, no such agreements were recorded in the lease files. Where no information was available, it was assumed that individual lessees and small inactive coal mining companies would not be able to assemble the 20-40 million dollars required to develop a typical new mine.

The 35 lease blocks are held by 34 different lessees, including all joint owners. Twenty of the lease blocks are held by lessees with the presumed capacity to develop the property. These 20 blocks represent 16 different lessees including joint owners. Fifteen lease blocks, involving 18 different lessees, did not meet the lease development capability or ownership test. Ten of the lease blocks that did not pass this screen are held by individuals. The accompanying table 8 shows the business categories of the current owners of the developed leases.

TABLE 8

Business Categories of Lessees of Undeveloped Federal Coal Leases in Utah

Category	Lease Blocks	Leases	Different Lessees
Individuals or their estates	10	10	1
Electric utilities	6	38	6
Steel companies	2	8	1
Natural gas pipeline companies	2	2	2
Subsidiaries of 18 major oil companies	3	20**	2
Subsidiary of minor oil companies	1	1	1
Land holding companies	3	3	3
Independent coal company	1	1	1
Metals & mining company	1	1	1
Resource development company	1	3	1
Other business categories	6	42**	4

SOURCE: J. Cannon

* Totals include joint owners.

** The total includes a block of 9 leases that are held jointly by Consolidation Coal Company (a subsidiary of an oil and gas major, Conoco) and Kemmerer Coal Company (a subsidiary of Lincoln, Inc., a diversified holding company controlled by the Kemmerer Family) - the lease blocks are included in each lessee business category.

Results of the Initial Screening.

While the technical screens do impose arbitrary standards on which the nonproducing leases were evaluated, the task force discussion and subsequent review provide a mechanism for identifying any instances where the assumptions were inapplicable or where additional research should be conducted. The initial screening was based on careful analysis of the characteristics of operating and favorable properties. The initial classifications were reviewed and discussed by the task force. In most cases, the task force concurred with the initial classification and often supplied additional information that supported the screening results. The task force suggested that for those leases which did not pass the threshold screens because of insufficient reserves, some additional research should be undertaken to determine 1) the characteristics and requirements for a viable small mine and 2) the availability of additional reserves on federal, state, or fee land for those leases with an insufficient federal reserves base. If the additional research warranted, the leases that did not pass the initial screening could then be reevaluated.

After the initial screening process had been conducted using 35 blocks with a total of 123 leases, 15 blocks met all threshold criteria, 20 blocks did not meet all threshold criteria.

Of the 20 that did not meet the threshold criteria, 3 failed solely because of insufficient reserves. A summary of the initial screening results is shown in columns 1 and 6 of Table 9.

It should be noted that the results of the screening match the results of the task force quite closely. Only one lease block classification was

changed based on additional information. It seems that the task force was unwilling or unable to distinguish among the larger tracts held by recognized companies, even with more information and experience than that available in-house before the meeting, and in some instances with less information.

TABLE 9

SUMMARY OF ANALYSIS OF UNDEVELOPED FEDERAL COAL LEASES IN UTAH MAY 1980

BLOCK NUMBER	LESSEE	ACRES	COUNTY	NUMBER OF LEASES	TYPE OF RESERVES - UNDERGROUND ON SURFACE (U/G OR S)	15 LEAST BLOCK CONTIGUOUS A COMPACT?	DOES BLOCK HAVE AT LEAST 15 MILLION TONS OF RECOVERABLE RESERVES?	DOES BLOCK RESERVES MEET MINIMUM COAL QUALITY REQUIREMENTS?	DOES LESSEE HAVE COAL MINING EXPERIENCE OR FINANCIAL CAPABILITY TO DEVELOP THE LEASE?	DOES LEAST BLOCK PASS ALL INITIAL SCREENS?	TASK FORCE CLASSIFICATION OF PROPERTY CHARACTERISTICS FAVORABLE (+) UNFAVORABLE (-), OR UNCERTAIN (?)	TASK FORCE REVIEW OF LIEKHOOD OF DEVELOPMENT OF LEASE BLOCK - BY 1986?	- BY 1991?	POSSIBLE SMALL MINE	ADJACENT TO ACTIVE MINE	REQUIRES ADDITIONAL RESERVES	OTA CLASSIFICATION OF LEAST DEVELOPMENT PROSPECTS FAVORABLE (+) UNFAVORABLE (-), OR UNCERTAIN (?)	OTA CATEGORY FOR FURTHER ANALYSIS
1	CARBON ENERGY BANK	3	276.99	CARBON	U	No	No	Yes	No	No	-	No	No				-	D
2	EUREKA ENERGY CO. (P&GE)	1	320.00	CARBON	U	Yes	No	Yes	Yes	No	-	No	No				?	C
3	KAISER STEEL CORP.	2	4,919.16	CARBON	U	Yes	Yes	Yes	Yes	Yes	+	No	No				+	A
4	KANAWHA-HICKING COAL & COKE	1	1,052.68	CARBON	U	No	No	Yes	Yes	No	-	No	No				-	D
5	WASATCH COAL CO.	1	280.00	CARBON	U	Yes	No	Yes	No	No	-	?	?				-	D
6	CARROLL COUNTRY COAL CO. (MCKINNEY)	1	411.60	ENERGY	U	Yes	No	Yes	No	No	-	No	No				-	D
7	C.W. & J.O. KINGSTON	1	120.00	ENERGY	U	Yes	No	Yes	No	No	-	No	No				-	D
8	CONSOLIDATION COAL & KENNER COAL CO.	9	18,025.94	ENERGY	U/S	Yes	Yes	Yes	Yes	Yes	+	No	?				+	A
9	INTERMOUNTAIN EXPLORATION CO.	1	160.99	ENERGY	U	Yes	No	Yes	No	No	-	No	No				-	D
10A	J. SANDERS EST.	1	80.99	ENERGY	U	Yes	No	Yes	No	No	-	No	No				-	D
10B	J. SANDERS EST.	1	80.99	ENERGY	U	Yes	No	Yes	No	No	-	No	No				-	D
11	KAISER STEEL CORP.	6	8,321.21	ENERGY	U	Yes	Yes	Yes	Yes	Yes	+	No	?				+	A
12	L & E WILBERG	1	90.00	ENERGY	U	Yes	No	Yes	No	No	-	No	No				-	D
13	N. MCKINNEY EST.	1	280.00	ENERGY	U	Yes	No	Yes	No	No	-	No	No				-	D
14A	NEVADA ELECTRIC INVESTMENT CO.	2	1,366.71	ENERGY	U	Yes	Yes	Yes	Yes	Yes	+	No	?				+	A
14B	NEVADA ELECTRIC INVESTMENT CO.	1	1,800.00	ENERGY	U	Yes	Yes	Yes	Yes	Yes	+	No	?				+	A
15A	UTAH POWER & LIGHT CO.	5	2,961.90	ENERGY	U	Yes	Yes	Yes	Yes	Yes	+	No	?				+	A
15B	PEABODY COAL CO.	1	80.00	ENERGY	U	Yes	No	Yes	Yes	No	-	No	No				?	C
16	SMITH HOLLADAY ASSOC.	1	80.00	ENERGY	U	Yes	No	Yes	Yes	No	-	No	No				-	D
17	SWISHER COAL CO.	1	1,908.66	ENERGY	U	Yes	Yes	Yes	Yes	Yes	+	No	Yes				+	A
18	C. FILTON & C. DENTON	1	80.00	GARFIELD	U	Yes	No	No	No	No	-	No	No				-	D
19A	G. FRANSEN	1	120.00	GARFIELD	U	Yes	No	No	No	No	-	No	No				-	D
19B	G. FRANSEN	1	40.00	GARFIELD	U	Yes	No	No	No	No	-	No	No				-	D
20	A. & V. RASMUSSEN	1	40.00	KANE	U	Yes	No	No	No	No	-	No	No				-	D
21	CONSOLIDATION COAL CO.	10	25,533.41	KANE	U	Yes	Yes	Yes	Yes	Yes	+	No	No				?	B
22	EL PASO NATURAL GAS CO.	1	1,440.00	KANE	U	Yes	Yes	Yes	Yes	Yes	-	No	No				-	D
23	KING CAMEL COAL CO.	1	240.00	KANE	U	Yes	No	No	No	No	-	No	No				-	D
24	NEVADA ELECTRIC INVESTMENT CO.	8	10,379.48	KANE	S	Yes	Yes	Yes	Yes	Yes	+	No	?				+	A
25A	PEABODY COAL CO.	9	19,162.64	KANE	U	Yes	Yes	Yes	Yes	Yes	+	No	No				?	B
25B	PEABODY COAL CO.	3	3,520.00	KANE	U	Yes	Yes	Yes	Yes	Yes	+	No	No				?	B
26	MONO POWER CO. ET AL.	21	40,277.35	KANE	U	Yes	Yes	Yes	Yes	Yes	+	No	No				?	B
27	S. H. WEST	1	960.88	KANE	U	Yes	No	Yes	No	No	-	No	No				-	D
28	UTAH INTERNATIONAL, INC.	20	16,158.22	KANE	S	Yes	Yes	Yes	Yes	Yes	+	No	?				+	A
29	COASTAL STATES ENERGY CO.	1	160.00	SEVIER	U	Yes	No	Yes	Yes	Yes	+	No	?				+	A
30	ENERGY RESERVES GROUP, INC.	3	5,345.67	SEVIER	U	Yes	Yes	Yes	Yes	Yes	+	No	?				?	C

Evaluation of Other Factors Affecting Lease Development Prospects

If a potential coal mine property meets the threshold criteria, a prudent developer will then consider other factors in determining if the parcel has favorable development prospects. These other factors include surface ownership of the leased land and of adjacent lands, availability of additional coal reserves, transportation, geoengineering conditions that could limit coal recovery, availability of mining infrastructure and supporting community facilities, reclamation potential, and possible impacts on air quality, water quality, water availability, and surface resources. As part of OTA's analysis of undeveloped lease tracts and as a complement to the initial screening process, the second part of OTA's analysis of undeveloped federal lease tracts includes a broad assessment of these conditions that might affect lease's prospects for going into production.

To provide a framework for examination of these other factors, OTA compiled a list of questions covering different conditions that might influence development prospects. These questions were compiled with the help of the project advisory panel, OTA consultants and Task Force participants. The questions are general in nature and were designed for use by all the coal leasing task forces as a kind of checklist to help in assessing lease development prospects. The questions cover the following subjects:

Ownership Factors - issues and conditions relating to the ownership of the surface and mineral rights of the lease and of contiguous lands and to the financial capability and mining experience of the lessee.

Market Factors - issues relating to the demand for and sale of coal produced in a region or from a particular lease block.

Transportation Factors - issues and conditions affecting the availability of transportation to move the coal produced in the region to market or to end-use facilities.

Geoengineering and Mine Siting Factors - geologic, geographic and engineering conditions relating to the potential mine site or region that might affect the overall favorability or unfavorability of coal mining in that area.

Legal, Institutional and Environmental Factors - considerations relating to federal, state, and local laws, regulations, and policies governing lease development and mining activities, and to the social, economic, political, and physical environment in which lease development would take place. These considerations are subdivided into these areas:

- Federal Land Management
- Surface Resources and Regulation of Mining Activities
- Air Quality
- Water Quality and Availability
- Socioeconomic and Community Conditions

Certain questions can be addressed regionally and the conclusions reached by the Task Force on those factors will be used for all leases within the region, unless there are local exceptions. For example, the impacts of market, location and siting considerations, community and socioeconomic factors can be discussed on a regional basis. Factors such as transportation, air quality, and water quality and availability have both regional and site-specific considerations. Factors such as ownership, surface resource protection, land management, and reserves base are highly site-specific and cannot be adequately considered except on a local basis.

A copy of the questions submitted to the Task Force is appendicized.

OTA's assessment of other factors that affect lease development prospects will be accomplished in three phases. The first phase is a preliminary survey by OTA staff to identify issues and conditions relating to coal development in the state or region under study. This survey includes field interviews with federal and state agencies, review of published materials, such as the regional coal environmental impact statements, and preparation of background papers by OTA consultants and Task Force participants.

During the second phase, the task forces are asked to consider the possible influence of these factors in evaluating the development prospects of the leases without mine plans and to identify the key issues and uncertainties relating to coal development in that region or state. OTA expects that the technical expertise, familiarity with local conditions, and insights of the Task Force participants will contribute to the determination of which factors or conditions tend to make a tract more or less attractive as a potential coal mine, and which have no significant effect.

The third phase involves followup studies to clarify and or resolve uncertainties about lease development prospects and analysis of major issues identified during the initial survey in Phase 1 and the Task Force discussions in the second phase. This third phase review will generally serve to summarize major issues, and to obtain additional information where required. The issues analysis on the state or regional level will contribute to the overall issue analysis to be conducted when task forces and the analysis of existing leases in approved or pending mining plans have been completed.

Preparation for the Task Force

In preparation for the Utah Task Force, OTA staff summarized the available information on the development prospects of the non-producing leases and made a preliminary identification of some of the major uncertainties facing new coal mine development in Utah. This information was used in applying the threshold criteria or screens and was summarized on lease block worksheets that were distributed to the Task Force. These summaries were based on:

1. Lease data summaries from the Department's computerized coal lease data system (ACLDS) with information on mine plan status, coal production, administrative, land management, and geological information on all Utah leases, updated by contacts with state run office.
2. Information on reserves, coal quality, past production, and abandoned mines obtained from one area mining supervisor based on mine plans and information submitted by the lessee and on rough estimates were made by USGS. This information was revised when better information or information from alternative sources was available.
3. Lease maps including a 1:500,000 scale overlay showing lease locations for use with maps of similar scale; topographic, minerals ownership, and plat maps for undeveloped leases; and special state and regional transportation system maps;
4. Information from OTA staff and interview meetings with USGS mining supervisor, OSM, BLM, state agencies, lessees, and others.
5. Information from published sources - EIS's, newsletters, federal register announcements, government reports, etc.
6. Information from OTA contractor reports, independent staff research, etc.

This information summary did not represent a concerted effort to collect raw data - but merely to compile information already available into a summary format for Task Force review.

Preliminary Issue Identification

In addition to assembling available information on the individual lease blocks, OTA staff also identified some of the issues and uncertainties regarding the prospects for development of certain lease blocks, or of certain regions in the state. The issue identification was made based on a review of the summary information and staff interviews in preparation for the Task Force meetings. The uncertainties identified were:

- o Intermountain Power Project - a site was recently selected for this large new coal fired power plant; uncertainty remains over whether the project will be constructed at its proposed scale and whether it will burn Utah coal.
- o Effects of Expansion of Coal Production in Central Utah - whether the supporting transportation systems, community facilities, water supplies and labor force in the Central Utah area (Carbon, Emery and Sevier Counties) would be able to absorb additional coal development or whether community impacts would result in a slowing of coal development as boom town problems emerged.
- o Alton Strip Mine Proposal - Unsuitability Petition - the proposed Alton Mine would be the first major strip mine in Utah. A coalition of environmental groups and local residents have petitioned to have the mine site declared unsuitable for surface mining; among the reasons cited are its proximity to Bryce Canyon National Park, possible impacts on air quality, on visibility, on aquifers, and reclamation problems. A final decision is expected in late 1980. No mining plan has been submitted.
- o Kaiparowits Plateau Coal Development - The Kaiparowits Plateau in Southern Utah is a vast undeveloped area with large coal reserves held by major mining companies and utilities and no active mining operations. Opening the Plateau to coal mining requires construction of transportation systems to move the coal and construction of community facilities to support mining operations. A minimum annual production of at least 30 million tons/year may be necessary to offset the costs of constructing transportation links and mining infrastructure.
- o Allen Warner Valley Energy Complex - this project includes construction of two power plant complexes in the Utah and Nevada deserts and a slurry pipeline or railroad connecting the powerplants to the coal source - the proposed Alton Strip Mine. DOI is preparing an environmental impact statement on the power plant project for required site and right of way approvals. Nevada and California would be the major consumers of electricity from the project; the project has not yet received approval from state regulatory agencies. There is also uncertainty over the water supply source for slurry pipelines.

The compilation of summary information on lease characteristics and issues and uncertainties affecting coal development in Utah served as a basis for Task Force and lease classifications.

Results of OTA Utah Coal Leasing Task Force

The OTA Utah Coal Leasing Task Force met for 4 days in Salt Lake City in late February to discuss the factors affecting coal development in Utah and to assist OTA in evaluating the development prospects of the 123 undeveloped leases in the State.

The task force was given information for each lease tract, including the current owner, mine plan status, and whether the tract met the threshold criteria for a viable mining property. The Area Mining Supervisor and coal specialist from the State Geological Survey provided a brief description of the lease block's location, geology, and quality of reserves. This information was augmented by the local knowledge, experience, and insights of the other participants. At the conclusion of each tract discussion, the task force members were asked to provide their opinions on the overall property characteristics of the tract and to classify the tract as a favorable, uncertain or unfavorable prospect for development by 1986 or 1991. The reasons and uncertainties behind these judgments were identified and discussed. The task force conclusions and OTA's independent review of the task force results and classifications are summarized in the following sections. A preliminary description of some of the issues raised by the task force is appendicized for reference. Additional research and analysis of issues and uncertainties affecting Western coal development will be conducted as the leasing study progresses.

During the task force sessions the participants made numerous observations about factors that affect coal development in central and southern Utah. In some instances, their conclusions are applicable to all leases within the state. Based on task force discussions, OTA has identified the major task force assumptions that were used in assessing all of the lease blocks.

TASK FORCE ASSUMPTIONS USED IN LEASE EVALUATION

Prior to evaluation of the development prospects of the individual lease blocks, the task force discussed some of the factors that affect coal development in the two coal regions - Central Utah/Uinta and Southwestern Utah. This allowed the task force to generalize about the impacts of some of the following factors on the development of all leases in the region or in subregions: Time required to develop a mine; new mine models; potential market for Utah coal; and ownership trends.

Time required to develop a mine - Task force members concurred that there is sufficient lead time to develop, permit and open a new mine by 1986 in Central Utah provided that some of the initial exploratory work has already been done. For a small mine, there is sufficient time to conduct the necessary exploration, mine design, construction, and permitting required to open a mine by 1986. There is ample time to explore and develop a new mine in Central Utah by 1991.

For Southern Utah more time will be required to develop the proposed new mining complexes in the Alton and Kaiparowits areas, which are not active mining areas and do not have the supporting infrastructure and transportation facilities. Task force members agreed that small scale operations could be underway by 1986 at the proposed Alton Mine site but that full scale operations would not come until 1987 or later. The task force agreed that there was sufficient time to explore, design, construct and permit a small mine on one or more of the small single lease tracts in Southern Utah to serve a local market.

New mine models - The task force generally accepted the profile of a

typical underground and surface mining operation in Utah in the 1980's that were developed by OTA with the assistance of the Colorado School of Mines Research Institute. The minimum size requirement was accepted as representative of a typical new mine, with two reservations as to use: 1) It did not provide any guidelines on the requirements for a small mine, and 2) the 500,000 ton per year production level was too high for a mine that was producing coal for industrial use such as cement plants and/or metallurgical coal. The task force members suggested that 200,000 tons per year would be the appropriate minimum size for an industrial mine. (As it turned out, the lease tracts with favorable reserves were evaluated as potential sources of steam coal for electric power generation using the 500,000 ton/year mine model.

Potential Market for Utah Coal

The task force identified the future market for Utah coal as the most determinative factor in assessing whether existing federal leases will be developed. In order to make a judgment on the development prospects of the lease tracts, the task force first reached a consensus on the potential market for Utah coal in 1990. (No market projection was made for 1985 - it was assumed that Utah production would not expand significantly until planned power plants came on line after 1985.) Estimates of future production ranged from a low of 18 million tons/year to the 45 million tons/year projected by the National Coal Association. The task force agreed on a range of 25-30 million tons/year in 1990 although some task force members believed that that figure is overly optimistic. The expected consumption of the 25-30 million tons of Utah coal production in 1990 was defined as follows:

Utah Power and Light (UP&L)	8 Mty
Intermountain Power Project (IPP)	8 Mty
Nevada (Cement plants and power generation for Nevada and California)	5 Mty
Pacific Gas and Electric (California Plants)	5 Mty
Miscellaneous (Industrial Use, including conversion of some Utah plants to self-generation)	<u>3.5 Mty</u>
Total	29.5 Mty

The projected level of production would be an increase of over 16 million tons over the total 1979 production of 12.4 million tons (of which 2 million tons were stockpiled). The task force's 25-30 million tons/ year market scenario includes the following assumptions:

1. The real price of coal will not increase substantially over the next decade. (Increases in the actual price will stem from the general impacts of inflation.)
2. The Eastern and Midwest markets will not increase because New Source Performance Standards ("scrubber regulations") removed the advantage of burning low sulfur Western coal.
3. Utah coal that is shipped out-of-state will move West, to California and Nevada, except for existing long-term contracts.
4. The current proportion of 45% in-state and 55% out-of-state consumption will continue.
5. The relative proportion of end uses of Utah coal will remain the same through 1990: 75% electric power generation and 25% industrial use (including coke production).
6. The market for metallurgical coal will not increase substantially.
7. The export market will remain limited. (Members estimated that total western U.S. exports to Japan, Taiwan, and Korea would not exceed 5 Mt by 1990.)
8. Southern Utah will not have any major coal production until after 1990 with the possible exception of the Alton Mine.
9. Carbon and Emery counties will supply all coal for the Intermountain Power Project (IPP) until the 1990's.
10. Central Utah will not supply any of the coal for the proposed Allen Warner Energy System. (The Allen Warner Valley complex and the Alton Mine are not included in the task force market scenario because they represent a special captive production situation.)
11. There will be little or no consumption of Utah coal for synthetic fuels production before 1990.

The task force assumptions about the size and composition of the market for Utah coal production were used in assessing the development prospects of the leases. The task force suggested that information on the expected markets for Utah coal, on the expected production from competing sources (existing and planned mines), on the amount of coal production committed under long-term contracts, and the projected mining costs on undeveloped leases could be used to determine whether or not these leases were actually competitive and would be likely to be developed

to meet new demand or to displace existing production. The information required to conduct this analysis, although much of it exists, was not available to the task force. Additional analysis of the expected market for Utah coal and of the estimated mining costs for undeveloped leases are required before reaching any conclusions on the development potential of federal coal leases in Utah.

Ownership Trends

Large coal companies and utilities are more likely to be able to develop federal leases than individuals. Small tracts held by individuals will generally be developed through assignments or operating agreements with adjacent coal mines.

The trend towards captive coal production by electric utilities will continue reflecting a deliberate policy decision by utilities to acquire and develop their own coal reserves for long-term security.

There is only a limited possibility for future development of small mines.

Task Force Classification of Lease Property Characteristics

The Task Force was asked to determine whether a lease block would be a favorable mine property to develop in Utah in the 1980-1990 period taking into consideration the recoverable reserves, coal quality, geology, topography, and surface resources of each lease block. Lease blocks were rated as favorable mine properties if they met the following:

1. Recoverable reserves base of 15 million tons.

Sufficient recoverable reserves to sustain a typical new mine for the average expected mine life of 30 years at 500,000 tons/year.

2. The coal reserves have these minimum coal quality values:

Heat value : at least 11,000 BTU/lb for underground reserves

at lease 8,000 BTU/lb for surface reserves

Sulfur : no more than 1.5 percent

Ash content: no more than 15 percent

3. The geoenineering conditions - e.g., geology structure, topography, present no major obstacles to mine design, operations, and coal recovery.
4. No substantial conflicts with or impacts on surface resources.

Leases that were classified as unfavorable properties did not meet one or more of the above criteria. No leases were rated as uncertain properties because of lack of information. The Task Force Classification of Lease Block Property Characteristics is shown in Column 7 of Table 9.

The Task Force conclusions on the characteristics of the block generally confirmed the results of the initial screening. Fourteen lease blocks were rated as favorable properties. All of these blocks passed the initial screening. These favorable tracts cover a total of 159,647.45 acres and contain an estimated 1,751 billion tons of recoverable reserves.

There were twenty-one lease blocks that were classified as having unfavorable property characteristics by the Task Force. There are different reasons why blocks were found to be unfavorable.

Of these twenty-one lease blocks, there were four blocks that were adjacent to existing mines and had good quality coal, favorable mining conditions, but did not have an adequate reserves base to support an independent operation. The Task Force suggested that these properties had some limited potential for development through an operating agreement with or assignment to the adjacent mine owner if that owner needed additional reserves.

Five tracts were suggested as potential small mine properties, however, only three of these tracts satisfied the expected coal quality requirements for the spot market for steam coal. Two tracts that had poorer quality coal, nevertheless, were identified by the Task Force as possible small mines to serve a local or lump coal market in south central Utah.

According to some Task Force members, three of the unfavorable tracts that did not contain sufficient reserves to sustain an independent mine were odd parcels that were obtained by the current lessees as part of a long term reserves acquisition strategy. The lessee could be expected to seek additional development rights on adjacent federal, state, or fee lands, if they had not already done so.

The Task Force rating of mine property characteristics differed from the OTA's initial screening classification in only one case. One block (El Paso #22) was classified as an unfavorable mine property because geologic conditions and highly dissected terrain on the lease would make mining significantly more difficult and expensive in comparison with other leases in the same area. This lease did pass the initial screening review - which had focused on more general geologic factors such as the depth, thickness, and dip of the coal seams rather than more site-specific geoengineering conditions such as access to the seams, split or lenticular seams, and topography.

The 21 unfavorable lease blocks cover a total of 6,382.06 acres and contain a total of 69.79 million tons of recoverable coal reserves.

Task Force Classification of Prospects for Development of Lease Blocks

The Utah Task Force participants concluded their discussion of existing federal leases by classifying the development prospects of the lease blocks using their best professional judgment and familiarity with the Utah coal industry. Participants were asked whether a lease block would be developed by 1986 or 1991 by the current lessee reserves. In reaching their conclusions, the Task Force used the following assumptions about development.

1. Additional federal or nonfederal reserves are not considered as part of the lease block.
2. The production level would satisfy diligence requirements - and would be at an annual rate of 2 1/2% of recoverable LMU reserves; multi-lease blocks would require LMU approval and 40 year mine life.
3. The mine would be developed in compliance with all applicable state and federal environmental laws.
4. The production from the mine would meet a portion of the market demand outlined by Task Force members. (All leases at this stage of evaluation were considered competitive since no information was available on relative mining costs and committed and uncommitted reserves in existing planned mines.)
5. Mine development would proceed as part of the normal and orderly course of business operations.

In reaching their conclusions on the prospects for developing the lease block by 1986 or 1991, the Task Force was encouraged to consider other factors such as the availability of transportation, and mining infrastructure, existence of a definite market for the production, environmental conditions - such as impacts on water resources, air quality, recreation and wilderness or primitive values and difficult reclamation conditions, impacts on neighboring communities, and their ability to support mine development.

The outlook for development of existing leases without mine plans by 1986 is generally unfavorable. The Task Force identified no tracts that would definitely be in production by 1986. The Task Force identified only two tracts that might be producing coal by 1986 under certain conditions. The Task Force agreed that there was little chance that any of the other lease blocks would be in full-scale production (e.g., at diligence levels) by 1986. Their expectation of 1986 production is consistent with the market scenario that Utah coal production is not expected to expand significantly over existing and planned operations until the latter half of the decade. For 1991, their expectation is somewhat rosier. One tract was identified as likely to be in production in 1991 and eleven tracts were ranked as uncertain development prospects. Development of the remaining 23 tracts was rated as unfavorable. Results of this classification are shown in Column 9 of Table 9.

Although the Task Force did not rate any lease blocks as having favorable development prospects for 1986, two tracts were rated by the Task Force as uncertain tending to be favorable under certain conditions. In one case, the Task Force classified a lease as uncertain tending to favorable assuming that an assignment or operating agreement were concluded to allow opening of a small mine to serve the lump coal or spot markets. In the other case, the lessee representative on the Task Force indicated that as a matter of policy, the lessee would begin production by 1986 to comply with diligence requirements, although such development would not otherwise occur in the normal course of operations.

For 1990, the Task Force identified an additional favorable block that they expected to be in production. This property is held by The Swis er Coal Company which has several active operations in the area and is currently mining out an existing property and is expected to shift production to a new location by 1990.

For 1990, the Task Force identified 11 blocks with 58 leases as having uncertain development prospects including the two tracts classified as conditional in 1986. The uncertainty is all of the properties have favorable/good development characteristics, for 9 of the 11 it is not expected that all of them could go into production because of limitations of market constraints. Of the lease blocks classified by the Task Force as uncertain, 9 are in Central Utah and 2 are in Southern Utah. Development of the full scale Alton-Allen Warner Valley projects were not expected until after 1990. Final decisions on whether to proceed with planning and design phases of the project are expected in late 1980.

The Task Force identified 23 lease blocks with unfavorable development prospects for 1990. These included 15 lease blocks held by individuals or small inactive mining companies. These leases generally did not have sufficient reserves to support an average mine and the current lessee was not expected to develop the lease. Five of these unfavorable lease blocks, with a total of 44 leases, are large tracts of undeveloped coal reserves on the Kaiparowits Plateau held by major coal companies and utilities. The prospects for development of any leases on the Plateau were characterized as highly unlikely by 1990 because of the lack of transportation and the absence of a definable market.

Task Force Observations and Conclusions On Other Factors Affecting Lease Development Prospects

During their free-ranging discussions of coal development in Central and Southern Utah and the development prospects of individual tracts, the task force addressed most of the considerations affecting coal development that were earlier identified by OTA in its questions. Although a full assessment of the influence of geologic, air quality, water resources, reclamation and surface management conditions on lease development potential requires site specific information, certain generalizations were proffered by the task force.

Summary of Conclusions on Coal Development Factors in Central Utah

Water Availability - Water supply for mine related activities in Central Utah is expected to be adequate. Water recovered from mine site should meet any needs. Water for community needs and power plants is a more serious concern. However, with incremental development in pace with expansion/upgrading of local water supply system, there should be sufficient water for development in the near and mid-term. Water availability is expected to become a problem eventually.

Water Quality - Water quality impacts can be mitigated or avoided by using existing technologies, sediment ponds, etc. Major concerns in the area are leaching of contaminants from Mancos Shale, interruption of aquifers, and lowering of water table from mining activities. It is expected that coal mining operations in watershed areas (such as leases located in national forests) that supply local culinary water supplies will have to meet stringent requirements to protect water quality and availability. These

requirements were not interpreted as imposing barriers to development - however, local sentiment, as reflected by task force members, is that given a choice, such as availability of other coal properties, companies would generally avoid sensitive watershed areas. The task force identified potential water quality concerns for leases in Central Utah that were located in Western Carbon and Emery counties and Eastern Sevier counties in the Wasatch coal fields.

(Note: - We have no information on the water requirements for a 500,000 ton per year mine and processing and loading facilities. OTA staff interviews with a Carbon County commissioner in June, 1979 identified water availability as a problem. Carbon County and Price City were experiencing strains on existing systems and were encountering some difficulty in obtaining financing for constructing new facilities to keep pace with expanding population demands. The county and city were sustaining growth due to mining activities in neighboring counties - so that economic benefit from mine did not go directly to the counties that were absorbing many of the impacts. Some task force members felt that this was not a problem and would be overcome in time.)

Air Quality - Air quality impacts and pollution control requirements are not expected to affect coal mine development or planned power plant construction in Central Utah. Large scale development could bring eventual air quality - related constraints on additional industrial or powerplant development in the area because planned developments will reduce available increments in pollution allowed in this Class II area. Additional concern was raised over possible impacts from fugitive dust from increased coal traffic and disturbed mined land on air quality and visibility affecting the San Rafael

Swell area in the Southern part of the region.

(Note: - We do not have information on air quality impacts of 500,000 ton per year mine - task force information and conclusions on air quality are based on BLM's Central Utah Regional Environmental Statement for Coal Development.)

Surface Resources Impacts/Reclamation - Since most mine development in Central Utah on Federal leases is expected to be underground mines, the task force felt that surface impacts would not affect lease development prospects. Principal surface impacts were identified as subsidence, and land disturbance for mine roads, catchment areas, settling ponds, coal storage piles, overburden storage and disposal piles, and surface facilities. With proper planning and operation, most areas could be reclaimed. The principal areas where difficulty in reclamation, in water quality control, and in mine operations can be expected are steep slopes and narrow canyons. In most of Central Utah, rainfall, soil characteristics, and land cover do not present reclamation problems. One area of concern was identified in the Southern portion of region where shadscale, shallow soil, or barren ground and lower rainfall would make reclamation more difficult and the area more susceptible to erosion by wind and water.

Surface Management - Because surface impacts from deep mining are considered to be less intrusive than impacts from strip mining, surface management impacts were not identified as affecting lease development prospects - except for those undeveloped and isolated leases in national forest areas. Forest Service permit stipulations and the general characteristics of forest areas - higher elevation, water shed areas, and significant wildlife habitats - deer, elk range, etc., - mean that coal development in forest

areas is more likely to have conflict with surface values.

(Note: - There were no Forest Service representatives on the task force. Forest Service officials were out on field duty when OTA staff visited the area in June. Additional input on impacts, surface values and NFS policy will be obtained from forest supervisors.)

Transportation - Most federal leases in Central Utah are located near existing road and rail transportation systems. In this region, coal would be moved by truck, rail, or conveyor belt to the powerplant site or main rail line. Improvements and repairs to the existing system to accomodate increased coal traffic are underway. The task force felt the distance that coal would be hauled by truck to main transportation system would not be a constraining factor in coal development. Coal producers in the Southern part of the region are hauling coal 60 (?) or more miles from existing mines to rail heads. Any additional facilities required could be built to meet demand. (Note: There is some difference of opinion among task force members on the source of initial capital for transportation construction - but there was consensus that the transportation system (existing or expanded) would be adequate for coal development.)

Socio-Economic Impacts and Community Infrastrure - The Task Force expects that development will proceed at incremental levels and that regional growth will occur at a manageable pace. Over time, the region should be able to attract any additional trained workforce to support development. State policy is to encourage dispersion of energy development over a wider area to spread benefits and impacts more evenly. Without such dispersion, some groups in the state are concerned that coal-related development could overwhelm the ability of Price City and Carbon County to respond to increased demands.

Water Availability and Air Quality impacts are expected to impose some constraint on future development (i.e., over and above the task force's projected 1990 level).

(Note: Some disagreement exists over the capacity of the Central area to support expanded coal development. The task force generally assumed that impacts would be dealt with adequately and community requirements would not be a factor that discourages mine development. The County commissioner and others that OTA staff spoke with in June expressed concern over the capability of the area to absorb and support development without major disruption and displacement of existing communities and their way of life; they cited loss of irrigated cropland, and higher real estate assessments to support community services. In Southern Utah the impression of Price area is of a boom town, similar to Rock Springs, Wyoming, with substantial changes in community needs and character.)

Summary of Conclusions on Coal Development Factors in Southern Utah

The task force did not address the factors affecting coal development in Southern Utah in as much detail as Central Utah because there was a general consensus that coal development in Southern Utah was considered highly unlikely before 1990, except for the possibility of some production at the proposed Alton Mine to serve the Allen-Warner Valley complex and the possibility of very small operations providing lump coal to the community of Escalante.

The following generalizations about factors affecting coal development in Southern Utah were drawn:

Market - The future market is uncertain for Southern Utah leases that are

not held by utilities. Those leases held by a utility consortium have only a speculative captive market at present because the growth of energy demand in the West and new power plant construction have not occurred as expected. Only the Alton leases are tied to a proposed power plant that is in an active planning stage.

Air Quality - Air quality impacts are of greater concern in this region than in Central Utah. It is more arid than the central area and thus more susceptible to degradation. The area is also a pristine air shed and includes several national parks, monuments and recreation areas, as well as other areas under consideration as potential wilderness areas. The impacts of coal development and transportation on air quality and visibility in this area are currently under study by Federal and State agencies. Anticipated air quality impacts would come primarily from mining and transportation.

Water quality - Rainfall in the area is generally lower than in Central Utah - and requires wider areas as watersheds for existing communities. There are already water availability problems in Southern Utah communities. The primary activity in the area is grazing. The proposed Alton Mine is located in an area that serves as watershed for a large area of South Central Utah. A major concern is not only about any disruption caused by surface mining but also potential impacts on aquifers and recharge areas in adjacent national forest areas.

Water availability - The proposed Alton coal development includes a large surface mine and coal slurry pipeline system. Mine development would require additional water use for mine operations and for community needs. Water rights and allocations are not settled. Mine operations are expected to interrupt some existing water supplies and alternative sources would have

to be provided until the original sources were reestablished.

Transportation - Development of federal leases in Southern Utah (other than a small mine trucking coal short distances to a local market) would require construction of a transportation system to move the coal to market. It is not expected that coal-fired power plants would be constructed near the mine sites because of water availability and air quality problems. Construction of proposed transportation systems, including roads, railroads and coal slurry pipelines, would require a minimum level of coal production. Estimates of the minimum level required to offset the construction of a railroad from the Kaiparowits Plateau have been 30 million tons. A major study of coal transportation and development in Southern Utah is currently underway. The study, coordinated by the U.S. Department of the Interior and the State of Utah, will examine the impacts of coal and transportation development in the region and will contribute baseline information required for preparation of site-specific and project-specific environmental impact statements. Completion of the study is expected by late 1980. Some interim results will be available in summer of 1980.

Barring an extraordinary change in Western coal demand and in new coal-fired power plant construction, it is not expected that the required transportation systems will be planned, permitted, or constructed by 1990 to allow any large scale development of existing federal leases on the Kaiparowits Plateau.

Surface Resources/Reclamation - More conflicts between surface resources and coal development were identified for leases in Southern Utah than in Central Utah. Southern coal development would take place in areas where there are not any large scale mining activities.

Surface mining, as in Alton, would displace the current surface users - ranchers who use the area for grazing, and the residents of the existing town of Alton to make way for mine operations. The reclamability of the area is under dispute. Although the area has good rainfall, favorable soil characteristics and currently supports vegetation, there is some question as to whether the hydrologic functions of the area could be reestablished after mining. The petition to declare the area unsuitable for mining asserts that part of the area constitutes an alluvial valley floor and that there has been no demonstration that such an area can be reclaimed to prior function. The reclamation specialist on the task force was of the opinion that parts of the area could be reclaimed over time provided that sufficient topsoil or plant growth medium was preserved and restored, that adequate rainfall was received, and that the area was properly graded so that existing vegetation could be reestablished. However, he did find that certain areas were difficult to reclaim because of steeper slopes, shallower soil, and existing vegetative cover. He did not address the issue of whether hydrologic functions could be restored.

In the Kaiparowits area, coal mining would conflict with some previously undisturbed areas that some conservation groups have advocated for wilderness classification. Existing surface uses are recreation and grazing. Reclamation in the more arid areas of Kaiparowits could pose difficulties. The rugged topography and steep cliff faces also pose operating and reclamation problems due to erosion from flash flooding in highly dissected terrains with little vegetative cover and very shallow topsoil.

Socio-Economic Impacts/Community Infrastructure

Development of coal leases in the Alton and Kaiparowits coal fields in Southern Utah would require new or expanded community facilities to serve the influx of a trained workforce to operate the mines. The areas are sparsely populated and rural. The principal industries are agriculture and tourism. Development of the Kaiparowits field would require an influx of miners and support personnel and their families to support coal production at a level of about 30 million tons a year. New communities and community services would have to be constructed, since the area is currently undeveloped. One of the greatest concerns of the impact of coal development in the Southern Utah region is the change in the character of the communities, with the entry of outsiders altering the indigenous religious and cultural composition of affected communities. This concern over "outsiders" is a relatively recent development, as the communities have gained a greater understanding of the magnitude of development required. The change in community composition or "way of life"/"community values" is also a predominant concern behind the area's opposition to construction of the MX missile system. "We don't want to become another Price" was a frequent sentiment encountered by OTA staff during visits to Southern Utah in February.

The Alton coal field is located closer to existing communities and highways. Because it is expected to be a surface mine, the population impacts are not expected to be as great as those associated with opening the Kaiparowits coal field, an underground mining area.

Relative Importance of Factors Affecting Coal Development

OTA has drawn some general observations about the relative importance of certain conditions in making a lease block favorable or unfavorable for development. These observations are based on task force comments and lease classifications. The factors that the task force apparently interpreted as favorable for development include the following:

Location in an active mining area - the lease block is near existing transportation and processing facilities and has ready access to potential markets; the area generally has a supporting mining infrastructure and the local communities have the capacity to absorb incremental increases in population due to mine development.

Large block of uncommitted good quality coal - availability of adequate amount of coal for long term supply contracts to meet future coal requirements of utilities would make the property favorable for "eventual" development by the current lessee either through a long-term contract or joint venture or through assignment.

Lease owned by an active mining company or utility - lessee would have the experience and financial resources to develop the lease either alone or by attracting partners (joint venture); these lessees were presumed to have acquired the lease with a serious intent to develop it (eventually) than individual brokers or speculators.

Location near or adjacent to an operating mine - lease could be developed through assignment or operating agreement as part of existing mine; alternatively, new mine on lease block could share facilities, access roads, etc. with existing mine.

There were several conditions that the task force treated as unfavorable for lease development:

National Forest surface management - in Carbon and Emery Counties, leases on Forest Service lands with no active mining operations, are expected to have problems with reclamation in steep canyons, conflicts with watershed, wildlife, and recreational resources.

Location in Southern Utah - area lacks transportation systems, coal mining infrastructure, and indigenous trained labor force; no clear indication of potential market except for captive operations.

The above observations, as well as the regional summaries, are preliminary and are presented for review and comment by the task force participants, the project advisory panel, and other interested parties. These conclusions and observations will be reexamined as part of the overall analysis of the development potential of federal leases in Utah when the analysis of leases in approved and pending mining plans is completed.

OTA Review of Task Force Conclusions

Following the Task Force meetings, OTA staff reviewed the lease block classifications, the Task Force suggestions and additional information on the Utah coal development. The purpose of the independent review was to identify and resolve any inconsistencies or uncertainties in the Task Force classifications and to define any general trends or observations that could be drawn from the Task Force discussions. As a result of this review, OTA also reached a classification of lease development prospects and divided the leases into four categories for further analysis.

OTA Evaluation of Lease Development Prospects

Based on the Task Force judgments and information assembled by OTA staff and contractors on the characteristics of the undeveloped lease blocks, OTA made an independent classification of the development prospects of the undeveloped leases. The results of this review are shown in Column 13 of Table 9. Briefly, the OTA classifications are as follows:

Favorable Development Prospects: 10 lease blocks/57 leases

This category includes leases that passed all the initial screens, were rated as favorable mine properties by the Task Force, and were classified as having either favorable or uncertain development prospects by the Task Force.

Uncertain Development Prospects: 7 lease blocks/46 leases

This category includes leases that have a possibility of development based on favorable mine property characteristics or special conditions identified by the Task Force. All but three of the leases in this category passed the initial screens. The undeveloped leases on the Kaiparowits Plateau are in this category.

Unfavorable Development Prospects: 18 lease blocks/20 leases

This category includes leases that were rated as unfavorable mine properties and unfavorable development prospects by the Task Force. All but one of the lease blocks failed the initial screen process. All of the small single lease blocks held by individual owners or inactive mining companies are in this category.

All in all, the results of the task force supported the initial screening process identification of the viable mine properties among existing lease blocks. Only 1 block that was classified as favorable during the initial screening was found to be an unfavorable mining property by the task force. That block was classified as unfavorable by the task force because of geologic and topographic conditions that were not part of the initial screening.

In reviewing the task force evaluations of lease development prospects, OTA found that some of the classifications were inconsistent with other information. For example, block no 5, a single lease held by the Wasatch Coal Company, was classified by the task force as having uncertain development prospects because of reported interest by prospective purchasers in developing a small mine on the property. The tract was earlier classified as unfavorable because the current lessee is not the party contemplating development and there was no case record of any assignment to the prospective developer. The tract will, however, be considered in the examination of the viability of small mines.

Three single lease tracts held by active coal mining companies were classified by OTA as uncertain development prospects pending additional analysis of availability of additional reserves. Two of these leases were classified as unfavorable prospects and one as favorable to uncertain by the task force. This change was made partly on the basis of task force suggestions that the blocks were part of larger tracts of nonfederal coal or adjacent to new leasing areas.

All leases that were classified by the task force as favorable properties with favorable or uncertain development prospects in 1991 were reclassified as favorable development prospects by OTA since these blocks represent the most likely candidates for development among the undeveloped leases.

Leases in southern Utah, with the exception of the two blocks making up the Alton mine, were classified as uncertain. The classification will be reexamined later in study after review of the status of proposed transportation and electric power projects that would be supported by Kaiparowits development.

Another reason for classifying southern Utah leases as uncertain is that the development prospects of the undeveloped leases are closely related to production from two large blocks of Kaiparowits leases with pending mining plans that will be evaluated by OTA mining engineering contractors. The uncertainties and the status of pending studies and decisions concerning southern Utah coal development are discussed in the issues section in the Appendix.

OTA also classified as uncertain development prospects the three single lease blocks in central Utah that failed the initial screening process because they did not have enough reserves to support an independent mining operation. The leases have good quality coal, are in active mining areas, and are held by companies that have the financial resources and mining capability to develop the tracts. The task force presented conflicting information on the potential for development for these tracts. Some follow-up analysis will be conducted to clarify the status of adjacent lands.

Leases that were found to have unfavorable property characteristics in the initial screening process were generally classified as unfavorable by the task force, although the task force did raise some alternative development possibilities that will be considered in the additional

analysis. These alternatives include operation of a small mine, development as part of an expansion of an existing or planned mine on adjacent lands; and opening a less than optimal mine on the property to satisfy diligence requirements and preserve the leasehold.

Based upon the task force conclusions and OTA classifications of the development prospects of existing federal coal leases without mine plans, some observations can be made about the amount of coal under lease that could go into production by 1990. The OTA classifications of development prospects (and the classifications for further analysis) do not mean that OTA has concluded that these leases will actually produce coal by 1990. Rather, the purpose of these classifications and of the task force discussions is to identify the existing federal lease tracts that could support viable mining operations in the future, those that could sustain a new mine but have substantial uncertainties relating to conditions that would support development, and those lease tracts that are unfavorable mine properties that are not likely to be developed.

Additional analysis is required to determine which, if any, of the leases not in mine plans can be expected to being production. Three tasks are planned for this analysis including: 1) a site-specific review of the favorable tracts by OTA's mining engineering contractors to estimate production potential; 2) an estimate of mining costs using a standard mine evaluation method; and 3) a competitive analysis of the production potential and the comparative mining costs of leases in existing and pending mine plans and undeveloped leases. OTA also plans to contact some of the lessees to obtain their views and any additional information on the lease block's development prospects they may wish to provide. Only after this additional analysis has been completed, will OTA make an overall estimate of the future production and revenue potential of the federal existing leases.

The analysis of production and revenues potential from existing federal leases will not be an easy task. OTA has no magic crystal ball and, as the following estimates of available reserves indicate, the amount of "good" coal under lease is so great that luck and shrewd business sense may play a more determinative role in development than the quality, quantity, or mining costs of coal under lease.

OTA identified 10 lease blocks with a total of 57 leases as favorable development prospects. These lease blocks have a total of 744.37 million tons of recoverable coal reserves (494.25 million tons of deep reserves and 250.12 million tons of strip reserves). Central Utah recoverable reserves total 472.12 million tons and southern Utah 322.2 million tons. This represents 40% of the Utah federal reserves not in mine plans.

Seven lease blocks were classified as uncertain, including 3 blocks in central Utah held by active mining companies but with insufficient reserves to support an independent new mine, and 4 large blocks of leases on the Kaiparowits Plateau. The leases in this uncertain category contain over one billion tons of recoverable coal reserves. (Central Utah reserves represent only 3.2 million tons of this total). All of these reserves are underground mineable. This category is 55% of undeveloped lease reserves.

Eighteen lease blocks with a total of 20 leases were classified as unfavorable prospects for development. The lease blocks contain a total of 66.8 million tons of recoverable underground coal reserves (24.8 million tons in central Utah; 42 million tons in southern Utah). This represents 4% of the undeveloped lease reserves in Utah.

Assuming that all of the favorable lease blocks were to produce at their diligence levels of 2½% per year of recoverable reserves, they would produce about 24 million tons/year with 18 million tons from Central Utah production and 6.2 million tons from Southern Utah. It is unlikely, however, that all of this coal could find a market at the Task Force's optimistic projection of 25-30 million tons per year of consumption in 1990. Undeveloped leases will have to compete against existing and pending mines, nonfederal coal sources, and new federal leases and PRLA's.

Conclusions and Implications of Analysis of Lease Classifications

Some significant, though not surprising, observations emerged from OTA's review of the existing federal leases without mining plans (although they represent only part of the existing leases and PRLA's in Utah):

1. Existing federal leases in Utah with favorable development prospects have over 744 million tons of recoverable coal reserves, however, it is clear even from a rough estimate of their production potential, that few, if any, of these leases will be developed to meet expected Utah coal demand over the next decade unless they displace production from existing or planned mines.

2. Although there is a substantial amount of coal under lease, it is unlikely that leases that are not currently in mine plans will contribute significantly to production by 1986.

3. Several large tracts on existing undeveloped leases could be in full scale production by 1991 if (as is possible) the lease tracts qualify for extensions of diligence requirements until 1991. If diligence requirements are strictly enforced, federal production will shift to new lease areas, including PRLA's. (There is speculation that some of the existing undeveloped leases will be "rolled over" - offered for competitive bid after relinquishment or termination and issued as new leases under the new coal management program.)

4. Many of the old small lease blocks that are held by individuals or small mining companies actually produced coal in the past to serve local markets. It is unlikely that more than one or two of these mines will ever be reopened.

5. The primary reason why the large tracts of good quality coal from federal leases in Utah have not gone into production is lack of demand. The large undeveloped federal lease tracts with favorable property characteristics are held by major mining companies and utilities which apparently have the financial resources and technical capability to develop the leases. Many of these tracts were originally obtained as part of ambitious long-term reserve acquisition strategies in expectation of an expanded market for low sulfur western coal. A leveling off of growth in electricity demand, changes in pollution control requirements for coal fired power plans, and current production overcapacity in the coal industry are among the probable reasons why the incentive to develop these lease tracts has not materialized.

These conclusions are tentative; they will be examined closely as OTA continues its evaluation of existing federal leases and PRLA's in Utah.

Classification of Leases for Further Analysis

The Task Force is only one part of OTA's analysis of existing federal coal leases in Utah. Analysis of the production potential of those leases in approved and pending mining plans is underway. An earlier summary of leases in operating mines will be updated and expanded to include leases in pending plans. OTA also plans to contact some of the lessees to obtain their views on lease development prospects and any additional information they might wish to provide. With information on all existing federal leases (and PRLA's) and information on the anticipated markets for Utah coal from ongoing contractor studies, OTA will then be in a position to make a more positive determination of the development potential of existing federal leases in Utah and of the expected federal revenues from the leases.

In order to complete the overall analysis of existing federal leases, OTA will conduct some additional analysis of the leases that were reviewed by the Task Force. Fortunately, as a result of the Task Force contributions, this additional study has been reduced somewhat by the identification of those leases with unfavorable development prospects and by the clarification of the major issues and uncertainties about the development prospects of the remaining leases.

OTA has divided the undeveloped Utah lease blocks into these four groups according to the block's development prospects and the follow-up analysis required to complete OTA's mandated tasks:

- o Group A - Intensive analysis of the development potential of favorable lease blocks - 10 blocks/57 leases;

- o Group B - Analysis of the uncertainties affecting regional coal development prospects in Southern Utah - 4 blocks/43 leases;
- o Group C - Analysis of leases with conditional development prospects - 3 blocks/3 leases;
- o Group D - Limited analysis of leases with unfavorable development prospects - 18 blocks/20 leases.

Group A - Intensive Analysis of the Development Potential of Favorable
Lease Blocks

The ten lease blocks in Group A have generally favorable property characteristics and were rated as favorable or uncertain development prospects by the Utah Task Force. These 57 undeveloped leases containing over 744 million tons of recoverable coal reserves are the most likely candidates for development as new mining operations to serve the expected market, therefore the leases will receive the most intensive follow-up analysis. The objective of this additional analysis will be to evaluate the production potential and competitive status of each tract, including a more detailed review of site specific data on environmental and engineering conditions and an analysis of estimated mining costs. A closer look at potential environmental or surface resource conflicts is especially warranted for those lease blocks, such as the proposed Alton Mine complex, where the task force identified possible mining or reclamation problems on all or part of the tract. The production potential of these undeveloped leases will be compared with the competing productive capability of approved and pending mines in reaching a determination of the expected production and revenues from all existing federal leases in Utah.

Group B - Analysis of the Uncertainties Affecting Regional Coal Development
Prospects in Southern Utah

Group B includes the 4 lease blocks on the Kaiparowits Plateau in Southern Utah. These 43 leases have generally favorable property characteristics, but were rated as uncertain or unfavorable development prospects because of the major uncertainties about future markets and transportation availability. The principal focus in the additional analysis effort for these lease blocks will be clarification of the uncertainties identified by OTA and the Task Force. Development of the existing leases on the Kaiparowits Plateau has been called an "all or nothing" proposition. Since a minimum level of around 30 million tons/year will be required to support construction of the necessary transportation systems, development of all the lease blocks on the Plateau, including those already in mining plans, is interrelated. Two mine plans for new underground coal mines on the Kaiparowits Plateau have been submitted to USGS by the El Paso Company. A proposed mine plan for task force block #26 has been submitted to OSM by the Mono Power, Resources Company and New Albion Resources Company utilities consortium. The production potential for the Group B lease blocks will have to be estimated to permit the evaluation of the pending Kaiparowits mining plans and to allow for reclassification of the lease blocks should the uncertainties be resolved before the completion of the OTA study.

Group C - Analysis of Leases with Conditional Development Prospects

Group C includes three single lease blocks that are owned by active coal developers and which the Task Force found to have good quality coal, a favorable location, but insufficient reserves to support a new mine.

According to several Task Force members, classification of these leases as unfavorable would be misleading since these leases were not similar to other unfavorable lease blocks because of the favorable ownership and coal quality considerations. OTA has concluded, after its review, that these three tracts are in fact sufficiently different from other unfavorable blocks and are representative of some undeveloped tracts in other active areas with potentially available federal and nonfederal reserves. We will, therefore, conduct a limited level of additional research to determine the status of the adjacent coal lands. OTA will review the classification of these leases if it is discovered that the lessee actually controls additional reserves that could be combined with the lease block to form a viable mining unit.

Group D - Limited Analysis of Leases with Unfavorable Development Prospects

Group D includes 18 lease blocks with a total of 20 leases that the Task Force classified as unfavorable mine properties and unfavorable development prospects. On review, these classifications remain unchanged. OTA's additional analysis of these leases will be limited. Yearly production streams will not be calculated because the leases are not expected to be mined. Some of the unfavorable leases might, however, be reviewed as part of other analysis tasks--such as, for example, the examination of the potential viability of small mines, or the review of mining plans on approved or pending mines where some unfavorable leases could be a possible source of additional coal reserves.

ISSUES AND UNCERTAINTIES
AFFECTING FEDERAL COAL DEVELOPMENT IN UTAH

In its review of existing Federal coal leases in Utah, OTA examined the characteristics of each undeveloped federal lease tract to evaluate its potential as a new mining operation in the next decade. As a result of this evaluation, OTA identified ten lease blocks with a total of 744 million tons of recoverable coal reserves as favorable mine properties. Seven more lease blocks with more than one billion tons of recoverable reserves were rated as uncertain prospects because mine development would be contingent on the successful resolution of external problems such as the construction of new transportation systems and coal-fired power plants or the availability of additional reserves. With more than 1.7 billion tons of good quality mineable coal in the Federal leases without mine plans and a potential productive capacity from these leases that exceeds the total projected 1990 consumption for Utah coal from all mines, development of new mining operations on the leases will turn on the resolution of the external issues and uncertainties that will influence the rate and scale of future coal production. The major issues and uncertainties affecting Utah coal development in the next decade are summarized in the following sections. The issues were identified based on the Utah coal leasing task force discussions and OTA's internal review of existing leases. The topics discussed include:

1. Uncertainties Related to Future Markets for Utah Coal Production:

- A. New starts, additional capacity, and timetable of operations for current and planned coal-fired electric generating units using Utah coal.

- B. Coal Supply Source for the Intermountain Power Project
- C. Nevada Electric Utility Demand
- D. Southern California Electric Utility Demand
- 2. Changing Structure of the Utah Coal Industry
 - A. Captive Mining Operations
 - B. Decline in the Role of Individual Operators and Small Mines
- 3. Enforcement of Department of the Interior's diligence regulations
- 4. New Federal Leasing
 - A. 1981 New Lease Sales Under the New Coal Management Program
 - B. Utah Power and Light Lease Exchange
 - C. Issuance of Preference Right Lease Applications
- 5. Southern Utah Coal Development
 - A. Allen Warner Valley Energy System
 - B. Alton Strip Mine Unsuitability Petition
 - C. Kaiparowits Coal Development and Transportation Study
 - D. Air Quality and Visibility Impacts from Coal Development

MARKET

The task force estimates of the potential size and composition of the Utah coal market in the next decade were complicated by a lack of data, such as long term contract information, and by uncertainties concerning overall demand and competing sources of supply.¹ The Task Force concluded that the market for Utah coal would remain limited in 1990. Members estimated that 30 Mt of Utah coal would be consumed in 1990; approximately half this amount would be consumed in-state, largely by utilities, and three-quarters of the total would be used for electric power generation. Mine-by-mine estimates of likely production to meet this demand, as compiled by EPA Region VII, the DOE Western Coal Monitoring System, and the Energy Information Administration, can be found at the end of this section.

The scope of the Utah coal market will depend on the following:

A. New Starts, Additional Capacity, and Timetable of Operation for Current and Planned Coal-Fired Electric Generating Units Using Utah Coal

Utility demand is decisive to expanded production of Utah coal for two reasons. First, three-quarters of Utah's total production is consumed by utilities: this percentage is not expected to change in the near future. Second, in recent years, utilities have gained an increasing share of Utah coal production and reserves and have become an important factor in coal development.

¹ OTA has two contractor studies in progress: a study on the national level by EEA Inc., and an analysis of Utah coal markets, by Dr. Frank Hachman, University of Utah. The results of these studies were not available for use during the Utah task force.

A list of steam generating plants which could consume Utah coal and may be in operation by 1988 can be found at the end of this section. For comparative purposes, a chart of the consumption of Utah coal by UP&L and Nevada power plants in 1977, the latest year for which figures are available, is also included.

B. Coal Supply Source for the Intermountain Power Project (IPP)

IPP has been repeatedly cited as a major consumer of central Utah coal. However, the construction schedule for IPP has not yet been established and firm commitments for coal supply have not been made. The Utah state government has voiced its official opposition to the use of out-of-state coal in the project. The state approved the new Lyndahl site for IPP with the expectation that the plant would consume central Utah coal.

Utah Power and Light Co. is 25% owner of IPP and is expected to use its Utah reserves as its source of supply. Some participating Utah municipalities and California utilities are still investigating alternative coal sources and have claimed that Wyoming coal is cost-competitive. IPP would consume 8 to 10 million tons of coal annually.

C. Nevada Electric Utility Demand

Utah is a major coal source for Nevada because of the transportation cost advantage and coal characteristics of Utah coal. Nevada boilers have been and will be designed to burn Utah and New Mexico coal.

Optimistically, this market could consume 5-7 Mt of Utah coal in 1990. Nevada utilities consumed 1.0 Mt of Utah coal in 1978. Nevada has 600 MW

of generating capacity in its existing coal-fired plants. An additional 2500 MW are planned in the Allen Warner Valley (AWV) System, of which Nevada Power and Light is a major partner. The task force excluded potential AWV coal demand from its estimate of 1990 coal consumption. Utah's Alton field is the projected coal source for AWV. Nevada Electric Investment, a subsidiary of Nevada Power and Utah International, Inc. hold the federal leases in the Alton coal field.

D. Southern California Utility Demand

The extensive development of coal-fired plants in Southern California is contingent upon (1) approval of construction and emission control plans, operating licenses, and rate bases by the California Energy Commission, the state Air Resources Board, and the state Public Utilities Commission, and (2) firm commitments for construction and financing by participating utilities.

Pacific Gas and Electric (PG&E) and its operating subsidiary, Eureka Energy Company, have actively sought to acquire coal reserves in Utah. The exact capacity and timetable of planned PG&E facilities which could utilize Utah coal are uncertain. PG&E's 1600 MW Collinsville plant is scheduled to open in 1987. It will require 5 Mt of coal annually, a portion of which is expected to come from Central Utah holdings.

TABLE 10

WESTERN COAL SURVEY

PERIODIC SUMMARY

PRODUCTION CAPACITY AND COAL UNDER CONTRACT FOR EXISTING AND PLANNED MINES IN UTAH

OPERATION	ACTUAL PRODUCTION 72	PRODUCTIVE CAPACITY: MILLION TONS PER YEAR										
		80	81	82	83	84	85	86	87	88	89	90
Carbon County												
AMCA Centennial Project		-	0.2	0.4	0.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0
BEAVER CREEK COAL CO., Gordon Creek 2,366 1/		0.6	0.7	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7
CALIF. PORTLAND CEMENT Soldier Canyon		0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
KAISER STEEL Sunnyside Nos. 1-3		0.8	1.0	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
PACIFIC GAS & ELECTRIC Fish Creek #1		-	-	-	-	0.1	0.2	0.1	0.2	0.3	0.2	0.4
PACIFIC GAS & ELECTRIC Fish Creek #2		-	-	-	-	0.1	0.2	0.1	0.1	0.3	0.7	1.0
PACIFIC GAS & ELECTRIC Dugout Canyon #1		-	-	-	-	-	-	0.2	0.3	0.3	0.5	0.5
PACIFIC GAS & ELECTRIC Dugout Canyon #2		-	-	-	-	-	-	-	0.1	0.2	0.3	0.5
PLATEAU MINING Starpoint Nos. 162		1.2	1.2	1.2	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
PRICE RIVER COAL CO., Price River 2/		1.3	1.5	1.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
U.S. FUEL King Nos. 465		0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
U.S. FUEL King #6		-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
U.S. FUEL King #7		-	-	-	-	0.2	0.2	0.5	0.5	0.5	0.5	1.0
U.S. STEEL B Canyon		-	-	-	-	-	0.7	0.7	0.7	0.7	0.7	0.7
VALLEY CAMP 3/ Belina No. 1		0.9	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
County Total	3.6	6.1	7.8	8.4	11.3	11.9	12.8	13.1	13.4	13.8	14.4	15.6
Emery County												
BEAVER CREEK COAL CO., 4/ Huntington Canyon #4		0.1	0.5	0.5	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7
CALIF. PORTLAND CEMENT 5/ Hidden Valley		-	-	-	0.2	0.4	0.5	0.5	0.5	0.5	0.5	0.5
COASTAL STATES ENERGY Skyline #1 6/		-	-	0.2	0.7	1.0	0.9	1.6	1.7	1.7	1.8	1.9
COASTAL STATES ENERGY Skyline #2 6/		-	-	-	-	-	-	-	0.4	0.6	0.7	0.7
COASTAL STATES ENERGY Skyline #3 6/		-	-	0.3	0.4	0.7	1.4	1.4	1.4	1.3	1.3	1.3
CONSOL-KEMMERER Emery		0.7	0.8	0.8	0.8	1.0	1.2	2.0	4.0	4.0	4.0	4.0
NORTHWEST CARBON INC. 7/ Rilda Canyon		-	-	-	1.5	0.7	1.0	1.3	1.5	1.5	1.5	1.5
NORTHWEST CARBON INC. 7/ Tiefork		-	-	-	-	0.2	0.4	0.7	1.0	1.0	1.0	1.0

3/ Subsidiary of Quaker State Oil Corporation.

4/ Arco bought property from Swisher Coal.

5/ Previously referred to as Ivie Creek Mine.

6/ Also located in Carbon County.

7/ Subsidiary of Northwest Energy.

1/ Arco bought property from Swisher Coal; mine previously called Swisher 2,366.

2/ Subsidiary of American Electric Power; mine previously called Braztah 365.

* FEDERAL LEASES

WESTERN COAL SURVEY

PERIODIC SUMMARY

STATE OF UTAH

OPERATION	ACTUAL PRODUCTION	PRODUCTIVE CAPACITY: MILLION TONS PER YEAR										
		80	81	82	83	84	85	86	87	88	89	90
Emery County continued												
* U.S. FUEL Mohrland		-	0.4	0.8	1.2	1.6	1.6	1.6	1.6	1.6	1.6	1.6 U
U.S. STEEL Geneva		0.5	0.5	0.5	0.5	0.5	-	-	-	-	-	UM
UTAH PWR & LIGHT Church		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0 U
UTAH PWR & LIGHT Deer Creek		2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4 U
* UTAH PWR & LIGHT Wilberg		2.0	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2 U
County Total	3.8	6.7	7.8	8.7	11.4	12.4	13.3	15.4	18.4	18.5	18.7	18.8
Kane County												
5M CORP. John Henry		-	-	-	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4 U
EL PASO Blue		-	-	-	-	0.1	0.2	0.3	0.3	0.3	0.3	0.3 U
UTAH INTERNATIONAL Alton Field		-	-	-	-	-	1.3	3.5	6.2	8.4	10.5	11.5 86
* UTAH PWR & LIGHT Escalante		-	-	-	-	-	-	-	-	-	-	2.0 U
County Total		-	-	-	0.3	0.5	1.9	4.2	6.9	9.1	11.2	14.2
Sevier County												
ENERGY RESERVES GROUP Knight		0.1	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5 U
ENERGY RESERVES GROUP Rock Canyon		-	-	-	-	-	0.1	0.3	0.6	0.7	1.0	1.0 U
ENERGY RESERVES GROUP Skutumpah		-	-	0.1	0.3	0.6	0.9	1.2	1.5	1.5	1.5	1.5 U
* SOUTHERN UTAH FUELS Sufco #1		1.8	2.0	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2 U
County Total	1.7	1.9	2.3	2.6	2.8	3.3	3.7	4.2	4.8	4.9	5.2	5.2
State Total												
Small mines	9.1	14.7	17.9	19.7	25.8	28.1	31.7	36.9	43.5	46.3	49.5	53.8
Large mines	1.2											
	7.9											

* FEDERAL LEASES

SOURCE: U.S. Department of Energy, Western Coal Survey 1981.

WESTERN COAL SURVEY

PERIODIC SUMMARY

COAL UNDER CONTRACT FROM EXISTING AND PLANNED MINES IN UTAH

OPERATION

COAL UNDER CONTRACT: MILLION TONS PER YEAR

	80	81	82	83	84	85	86	87	88	89	90
Carbon County											
BEAVER CREEK COAL CO., Gordon Creek 2,3,66	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
CALIF. PORTLAND CEMENT Soldier Canyon	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
KAISER STEEL Sunnyside Nos. 1-3	0.8	1.0	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
PACIFIC GAS & ELECTRIC Fish Creek #1	-	-	-	-	0.1	0.2	0.1	0.2	0.3	0.2	0.4
PACIFIC GAS & ELECTRIC Fish Creek #2	-	-	-	-	0.1	0.2	0.1	0.1	0.3	0.7	1.0
PACIFIC GAS & ELECTRIC Dugout Canyon #1	-	-	-	-	-	-	0.2	0.3	0.3	0.5	0.5
PACIFIC GAS & ELECTRIC Dugout Canyon #2	-	-	-	-	-	-	-	0.1	0.2	0.3	0.5
PRICE RIVER COAL CO., Price River	1.3	1.5	1.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
U.S. FUEL King Nos. 4&5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
U.S. STEEL B Canyon	-	-	-	-	-	0.7	0.7	0.7	0.7	0.7	0.7
VALLEY CAMP Belina #1	0.9	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
County Total	4.4	5.4	5.6	7.9	8.1	9.0	9.0	9.3	9.7	10.3	11.0

Emery County

BEAVER CREEK COAL CO., Huntington Canyon #4	0.1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
CALIF. PORTLAND CEMENT Hidden Valley	-	-	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
U.S. STEEL Geneva	0.5	0.5	0.5	0.5	0.5	-	-	-	-	-	-
UTAH PWR & LIGHT Church	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
UTAH PWR & LIGHT Deer Creek	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
UTAH PWR & LIGHT Wilberg	2.0	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
County Total	6.0	6.5	6.5	6.7	6.7	6.2	6.2	6.2	6.2	6.2	6.2

Kane County

UTAH INTERNATIONAL Alton Field	-	-	-	-	-	1.3	3.5	6.2	8.4	10.5	11.5
UTAH PWR & LIGHT Escalante	-	-	-	-	-	-	-	-	-	-	2.0
County Total	-	-	-	-	-	1.3	3.5	6.2	8.4	10.5	13.5

Sevier County Total

	0.5	0.9	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
State Total	10.9	12.8	13.5	16.0	16.2	17.9	20.1	23.1	25.7	28.4	32.1

* FEDERAL LEASES

TABLE 11

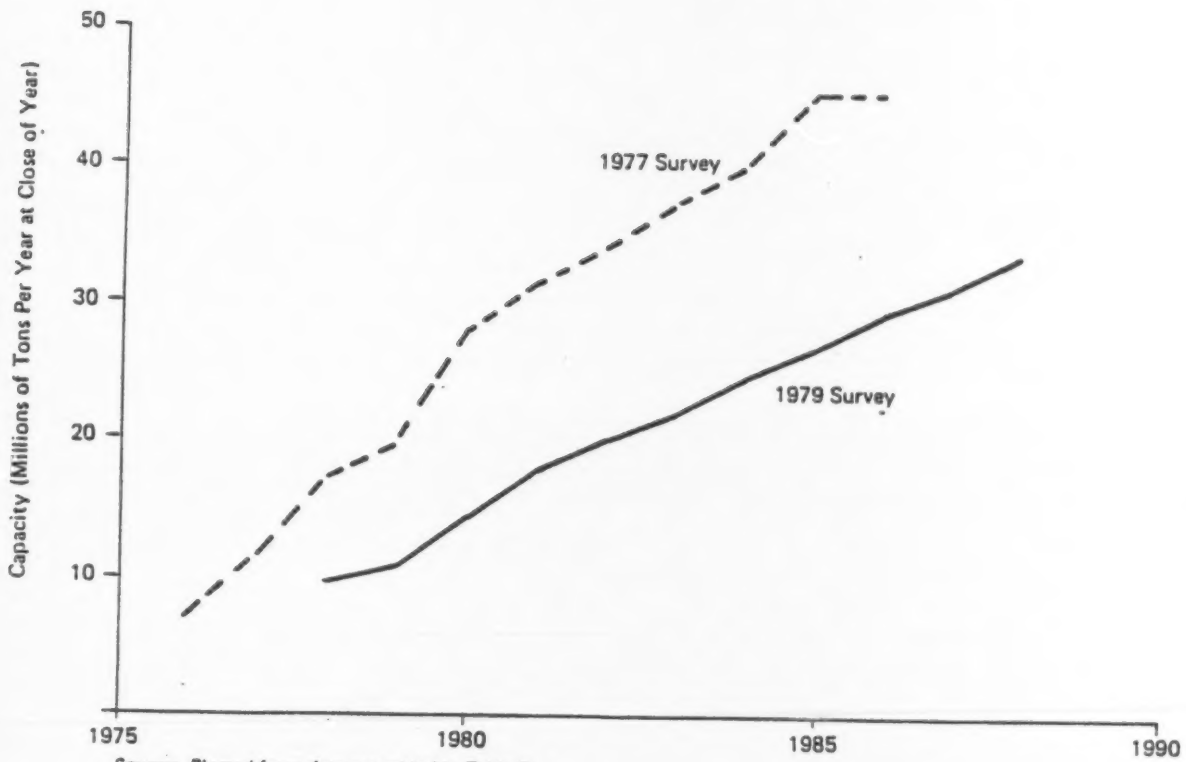
Capacity by Year of Coal Mines in Development,
Expansion, or Planning Stages in Carbon,
Emery, Sevier, or Wayne Counties, Utah for
1977 and 1979 Keystone Surveys

<u>Year</u>	<u>Capacity</u> (in Million Tons per Year at close of Year)	
	<u>1977</u> <u>Survey</u>	<u>1979</u> <u>Survey</u>
1976	6.70	
1977	11.20	
1978	17.10	
1979	19.65	9.90
1980	27.80	10.53
1981	31.28	13.91
1982	34.19	17.75
1983	37.02	20.00
1984	40.32	21.77
1985	45.15	24.43
1986	45.15	26.49
1987		29.40
1988		30.93
		33.43

Source: 1977 Survey: Coal Age, Vol. 83, No. 2, Feb. 1978
1979 Survey: Coal Age, Vol. 85, No. 2, Feb. 1980

TABLE 12

Capacity by Year of Coal Mines in Development, Expansion, or Planning Stages
in Carbon, Emery, Sevier, or Wayne Counties, Utah
for the 1977 and 1979 Keystone Surveys



Source: Plotted from data assembled in Table 5.

TABLE 13

LARGER COAL-FIRED GENERATING PLANTS IN ARIZONA
COLORADO, NEVADA, NEW MEXICO, UTAH AND WYOMING
1977 COAL AND FUEL COSTS

	Capacity (Megawatts)	Net Generation (Million kwh)	Coal Burned (Thousands Short Tons)	Per Ton (Dollars)	BTUs/ Pound	Cost Per Million BTU (Cents)	Fuel Production Expense (Mills Per kwh)
Arizona							
Navajo	2,409.5	15,399.9	7,134.4	9.98	10,833	46.04	4.86
Four Corner 1,2,3	633.6	3,442.3	2,193.9	5.46	8,762	33.07	3.74
Four Corner 4,5	1,636.2	8,218.7	4,560.4	5.43	8,785	30.90	3.05
Colorado							
Arapaho	250.5	1,418.7	851.4	13.75	10,846	63.41	9.01
Cherokee	801.3	4,443.5	2,039.4	12.79	10,922	58.54	6.89
Comanche	778.5	4,882.7	2,895.1	10.74	8,508	63.09	6.54
Valmont	281.8	1,251.4	429.0	16.36	10,628	76.99	9.67
Hayden 1	190.0	1,146.6	582.2	6.13	10,811	28.00	3.36
Hayden 2,3	275.4	1,701.8	844.3	6.12	10,739	28.00	3.31
Nevada							
Gardner	340.9	2,181.9	1,026.6	25.77	12,017	107.22	12.18
Mohave	1,636.2	6,723.5	3,290.9	10.06	10,898	48.43	5.25
New Mexico							
San Juan	676.4	3,242.7	1,798.7	7.21	9,636	37.41	6.21
Utah							
Carbon 2	113.6	685.9	313.8	16.38	11,180	73.24	7.52
Gadsby 3	113.6	659.4	259.7	18.19	11,284	80.60	9.34
Huntington 2	446.4	1,490.1	631.7	15.04	12,048	62.40	6.47
Wyoming							
Jim Bridger	1,681.5	9,168.0	5,112.0	6.13	9,309	32.91	3.50
Dave Johnston	816.7	4,883.4	3,441.0	3.46	7,460	23.19	2.48
Naughton 1	163.2	1,137.9	625.9	9.40	9,589	49.04	5.21
Naughton 2	217.6	1,340.3	739.0	9.28	9,589	48.40	5.17
Naughton 3	326.4	2,030.1	1,124.7	9.22	9,601	48.01	5.18

^a Data for Mohave are exclusive of the 20 percent operated for Los Angeles Department of Water and Power.

Source: Steam-Electric Plant Construction Cost and Annual Production Expenses, 1977, U.S. Department of Energy, (December 1978), DOE/EIA-0033/3(77).

TABLE 14
Significant Coal-Fired, Generation Additions
Utah, Nevada, and California
1980-1988

Plant	Location	Size (in MW)	Commercial Operation Date
Hunter 2	Utah	400	June 1980
Valmy 1	Nevada	250	October 1981
Hunter 3	Utah	400	June 1983
Warner Valley 1	Utah	250	June 1983
Reid Gardner 4	Nevada	250	June 1983
Warner Valley	Utah	250	June 1984
Valmy 2	Nevada	250	October 1984
Hunter	Utah	400	June 1985
Allen 1	Nevada	500	June 1985
Allen 2	Nevada	500	June 1986
Intermountain 1	Utah	750	July 1986
Fossil 1	California	800	July 1986
Unknown 1 (Sierra Pacific Power)	Undetermined	125	May 1987
California Coal	California	250	June 1987
Allen 3	Nevada	500	June 1987
Intermountain 2	Utah	750	July 1987
Fossil 2	California	800	July 1987
Wellington 1	Utah	500	June 1988
California Coal 2	California	250	June 1988
Allen 4	Nevada	500	June 1988
Fossil 3	California	800	June 1988
Intermountain 3	Utah	750	July 1988

Source: Ten Year Coordinated Plan Summary, 1979-1988, Western Systems
Coordinating Council (Salt Lake City, Utah) May 1979.

CHANGING STRUCTURE OF UTAH COAL OPERATIONS

Captive Mining

The rise of captive and utility coal mining operations within Utah may influence the rate and location of lease development. Steel companies have operated captive mines for industrial and metallurgical coal production for decades. In recent years, utilities have gained an increasing share of Utah coal production and reserves. Utilities directly own or control through subsidiaries 29% of all the acreage under lease in Utah, compared to a national average of 18%. Utah Power and Light and Pacific Gas and Electric, through its operating subsidiary, Eureka Energy Company, in particular, have acquired large blocks of Central Utah coal. More than seventy of the ninety-six leases in Southern Utah are owned by or associated with utilities. The majority of these leases are held by resource development or land agent subsidiaries and tend to be developed in large, multi-year operations. These acquisitions represent a deliberate policy choice by the utilities to move to captive operations as their primary source of future supply. Captive operations are, to some extent, insulated from market forces and develop on a different timetable from non-captive mines.

Decline in the Role of Industrial Operators and Small Mines

The number and total acreage of leases owned by individuals has shown a marked decline in the state. While 58% of all leases, and 11% of all acreage under lease, were owned by individuals in 1950, individuals owned only 8% of all leases and 4% of all acreage by 1980. Most of the leases owned by individuals are smaller than the state-wide average. Many of the

non-producing leases held by individuals are inactive small mines that once served local markets.

A complicating influence to individual or small company entry is the increase in recent years of the average mine size in Utah. New mines now average 500,000 tons per year, and require initial investments of 20 to 40 million dollars. Fewer opportunities for the entry of new small mines exist.

TABLE 15

DISTRIBUTION OF FEDERAL LEASES IN UTAH BY PRINCIPAL

LINE OF BUSINESS ACTIVITY (1980)

<u>Principal Line of Busi- ness Activity</u>	<u>No. of Leases in Utah</u>	<u>Acreage of Leases in Utah</u>	<u>Percent of Utah Acreage</u>	<u>National Percent of Acreage</u>
Individuals	17	11,807	4%	6%
Utility	60	79,394	29%	18%
Resource Devel- opment	29	54,132	19%	11%
Wholly Owned Coal Mining	46	83,290	30%	35%
Oil & Gas Major	24	38,273	14%	21%
Oil & Gas Minor	28	42,596	15%	9%
Metals & Mining	20	16,163	6%	5%
Steel	16	24,244	9%	9%
Total	201	277,807	-	35%

SOURCE: James Cannon, OTA Contractor Report
May 1980.

ENFORCEMENT OF THE DEPARTMENT OF INTERIOR'S DILIGENCE REGULATIONS

In May 1976, the Department of the Interior promulgated regulations that interpreted the requirements of Section 7 of the Mineral Leasing Act that federal coal leases could be held for "indeterminate periods upon condition of diligent development and continued operation of the mine or mines, except when such operation shall be interrupted by strikes, the elements, or casualties not attributable to the lessee." The regulations specify that federal coal leases issued before passage of the Federal Coal Leasing Amendments Act of 1976 must produce coal in commercial quantities from the logical mining unit (LMU) reserves of the leasehold by June 1, 1986. Commercial quantities is defined as production equal to one fortieth (2 1/2%) of the LMU reserves. Once the lease has begun commercial production, the lessee must satisfy the continuous operation requirement defined in the regulations as mining one percent of the lease reserves annually. If the lessee fails to meet the diligent development and continued operation requirements, collectively referred to as "diligence requirements", the lease is subject to cancellation.

OTA's review of the undeveloped federal leases in Utah and a summary examination of the Department's diligence requirements has led us to the conclusion tht it would be unwise to assume for purposes of our analysis, as some others have done, that application of diligence requirements would result in the termination of all leases that had not attained the required level of production by June 1, 1986. Accordingly, in the task force analysis, members were asked to assume that leases that were favorable for development by 1991 would qualify for an extension of the diligence period. There are many reasons why OTA has not interpreted the June 1986 date as an

absolute deadline and why OTA plans to examine the issue of diligent development in more detail as the study progresses. Among these reasons are the following:

1. The diligence regulations are applied to LMU's, not leases. One or more leases can be combined into an LMU with approval of the Department. Production for the entire LMU is then the basis for diligence determination. The regulations specify that all lands in an LMU must be contiguous, under the control of a single operator, and capable of being developed and operated as a unified operation with complete extraction of the LMU reserves within 40 years from the date of first approval of a mining plan for that LMU.
2. Lessees may qualify for an extension of the diligence period under certain circumstances if diligent development is significantly impaired by:
 - a. a strike, the elements, or casualties not attributable to the lessee;
 - b. an administrative delay in the Department that is not caused by the lessee's action; or
 - c. extraordinary circumstances not attributable to the lessee and not foreseeable by a reasonably prudent operator.

If any of these conditions are found the Secretary can authorize an extension for a period equal to the delay in development. Extraordinary conditions exclude any condition arising out of normally foreseeable

business risks such as: fluctuations in prices, sales, or costs, including foreseeable costs of compliance with environmental protection requirements; commonly experienced delays in delivery of supplies or equipment; or inability to obtain sufficient sales.

3. The Secretary may grant a single 5 year extension for any of the following:

- a. additional time needed to complete development of an advanced technology such as in situ gasification or liquefaction processes;
- b. additional time required because of the magnitude of the project involved. (Magnitude is ordinarily defined as meaning, but not limited to, a mine producing two million tons a year by underground methods or five million tons per year by surface operations in the first year after the extended diligence period);
- c. a contract which is a firm commitment for the sale or use of the first one fortieth of the LMU reserves after the ten year period (after 1986).

Regardless of the reason for the extension, the lessee must produce the first one fortieth of the LMU reserves before the end of the extended term. The Department has recently requested public comments on the guidelines to be used in granting diligence extensions under the above discretionary criteria.

4. Failure to attain diligent development for leases issued before

August 4, 1976 does not result in automatic termination of the lease. The lease becomes subject to cancellation, which means that the Department of Interior can request that legal proceedings be commenced against the lessee to have the lease revoked for violation of the lease terms and governing regulations. Enforcement action in the courts would be conducted by the Department of Justice. There is no requirement that the Department of Interior actually commence cancellation proceedings for violation of diligence requirements. Indeed, it can be expected that the Department will rely, to a large extent, on voluntary compliance with the diligence requirements. If and when the Department proceeds with enforcement action against a non-producing lessee, the first cases will probably be carefully chosen because of some of the legal uncertainties involving application of diligence requirements to existing leases.

5. The Secretary can use his existing authority under the Mineral Leasing Act to suspend the terms of an existing lease, thus suspending the diligence term, or to approve a modification of the lease to reduce the amount of the LMU reserves and thus the level of production required. Finally, the Secretary can waive violations of the lease terms or regulations and thus, informally, extend or modify application of diligence requirements under his general discretionary authority to administer leases in the public interest. Department policies provide that a violation of lease terms is not formally waived except in writing to the lessee.

The influence of enforcement of diligent development and continued operation requirements on the timing and magnitude of development of new coal operations in Utah remains unclear. The undeveloped lease blocks that were ranked as favorable development prospects include large tracts that could conceivably support sizable mines or synthetic fuel projects and several tracts that are held by electric utilities as captive coal sources for new or existing power plans. These tracts could arguably qualify for a discretionary extension of the diligence period until 1991.

The large utility holdings of Federal leases in Utah present a possible conflict with one of the purposes of diligent development requirements--that of encouraging production from federal leases to serve national coal needs.

In recent years, utilities have moved to secure long-term reserves that are then "dedicated" to supply specific power plant needs for 35 to 40 years. A 40-year commitment can be consistent with diligent development requirements. However, because electric power demand and powerplant construction are behind schedule in the region, leases that were acquired to support particular plants would not now supply a captive market if developed to meet the diligence deadline. Utilities may be less likely to develop these leases to supply non-captive operations.

NEW FEDERAL LEASING

The existing federal coal leases will have to compete with new federal leases as well as with state and private coal lands for a share of future Utah coal development. These new federal leases will result from the planned 1981 competitive lease sale, Utah Power & Light Company's exchange of PRLA's on the Kaiparowits Plateau for federal reserves in Central Utah, and from issuance of some or all of the pending PRLA's.

The Department of the Interior has set a target of 322 million tons of in-place coal reserves for its planned sale of new federal leases in 1981. These reserves are being offered to achieve the 1985 through 1990 production goals for the Southwestern Utah Federal Coal Production Region and to promote competition in the region. The amount of new federal reserves was set after analyzing the production potential of existing leases and consultation with state and federal agencies. The analysis included the coal needs for the Intermountain Power Project and the Utah Power & Light lease exchanges in deriving the leasing target. The target of 322 million tons was derived from the projected shortfall in annual regional production. The additional reserves should meet roughly 80 percent of the 5.5 million tons per year short-fall in production at a recovery rate of 42 percent over a typical 30 year mine life. The 322 million tons target represents an increase from the 109 million ton tentative target announced by the Secretary in June of 1979. The issuance of pending PRLA's will not count against the 322 million ton target.

The Department has solicited and received industry expressions of interest in 14 new leasing tracts in Central Utah. These tracts are being evaluated under the new leasing procedures in preparation for final tract

ranking and selection under the new federal coal management program. A summary of the tracts under consideration is included at the end of this section.

SUMMARY OF PROPOSED NEW LEASING TRACTS IN CENTRAL UTAH

TABLE 16

Tract	County	Township & Range	Acres	Source: Bureau of Land Management, Utah State Office February 1980			Expressions
				Demonstrated Reserves Base (Mt)	Recoverable Reserves U/G \$		
1. Emery North	Emery	T 22 S, R 6 E	2,201	43.0	11.0	13.6	Plateau Consol Mountain Fu
2. Emery Central	Emery	T 22 S, R 6 E	2968	42.0	-	37.8	Consol MTn Fuel
3. Emery South	Emery	T 24 S R 6 E	749	12.1	-	10.3	Consol
4. Meetinghouse Canyon	Emery	T 16 S R 7 E	1063	31.0	12.4	-	UP&L
5. Cottonwood	Emery	T 17 S, R 8 E	2400	5729	23.2	-	UP&L
6. Muddy Creek	Emery- Sevier	T 21 S, R 5 E T 21 S, R 6 E	11,601?	129.2	48.2	-	UP&L Wescar Mapco, Inc. Mobil
7. Muddy Creek East	Emery - Sevier	T 21 S, R 5 E T 21 S, R 6 E	5730	61.4			
8. Muddy Creek West	Sevier	T 21 S, R 5 E	5880	85.1			
9. North Horn Mountain	Emery	T 18 S, R 6 E T 19 S, R 6 E T 18 S, R 7 E T 19 S, R 7 E	9280	190	75.8		UP&L Mapco, Inc. Wescar
10. Little Bear Canyon	Emery	T 15 S, R 7 E T 16 S, R 6 E T 16 S, R 7 E	5436	102.2	38.9		UP&L Swisher
11. Trail Mountain	Emery	T 17 S, R 6 E	1083	12.0	4.8		Fetterolf Grp Wescar UP & L Plateau
12. Castle Valley Ridge	Carbon- Emery	T 14 S, R 7 E T 15 S, R 7 E	3056	33.2	13.3		Valley Camp
13. Slaughterhouse Canyon	Carbon- Emery	T 13 S, R 7 E		2.2	-	1.9	Valley Camp
14. North Trough Springs Ridge	Carbon- Emery	T 14 S, R 6 E T 14 S, R 7 E	2065	65.4	14.1		Valley Camp

Utah Power & Light Co. Lease Exchange

The Federal Coal Leasing Amendments Act of 1978, Public Law 95-544 authorizes the Secretary of the Interior to exchange eight preference right lease applications held by Utah Power & Light Co. for leases on other federal coal lands in Utah. The lease rights exchanged and the new leases are to be of equal value; the Secretary is authorized to pay or receive up to 25 percent of the value of the new leases in order to equalize the exchange. Under the terms of the legislation, UP&L is entitled to receive new leases with the same terms and conditions as they would have received as the holder of the surrendered PRLA's. The exchange legislation was supported by several environmental groups as a compromise to move UP&L's coal mining operations out of Southern Utah, where they have opposed any mine or power plant construction.

UP&L has actively pursued the lease exchange to obtain new coal reserves in Central Utah that would be closer to its existing and planned power plants and that would present fewer potential environmental problems. UP&L has submitted a formal expression of interest for 7 tracts targeted for leasing in the July 1981 competitive lease sales. The nominated tracts contain an estimated 534 million tons of recoverable underground coal reserves. The 8 southern Utah PRLA's contain an estimated 1 billion tons of in place reserves and approximately 300 million tons of recoverable reserves. The tracts nominated by UP&L are shown in the summary of new leasing tracts. The final terms of the lease exchange and UP&L's entitlement will be set following an economic evaluation of both the PRLA's to be relinquished and the new leasing tracts.

Issuance of Preference Right Lease Applications

There are currently 25 pending preference right lease applications for federal coal lands in Utah, including the 8 PRLA's involved in the UP&L exchange. The 25 PRLA's cover a total of more than 75,000 acres of federal land and contain more than 2 billion tons of in place coal reserves. There are an estimated 267 million tons of recoverable reserves on the 18 PRLA's for which such information is reported. 22 of the PRLA's are located in Southern Utah.

The Department of the Interior plans to process all the PRLA's by 1984 under the provisions of the new federal coal management program. New leases will be issued to applicants who demonstrate that they have discovered a commercial coal deposit that can be mined at a profit after consideration of all the costs of complying with the lease terms and all applicable laws and regulations. Processing will be conducted as part of the land use planning efforts and will include consideration of whether issuance of the PRLA is compatible with the land use plan.

Even if the PRLA's are converted into leases by 1984, it is unlikely that large scale production would commence until after 1990 because of the lead time required to conduct exploratory drilling, prepare a mine plan, and construct the mine and supporting facilities. The PRLA's do, however, represent an important competing source of coal for the 1990's market.

TABLE 17

PENDING PREFERENCE RIGHT LEASE APPLICATIONS IN UTAH

Applicant	number	County	Acres
Hiko Bell Mining Co.	U0145657	Kane	640.0
Jessee H. Knight	U0149348	Garfield	1856.0
	U 0143949	Garfield	3240.0
	U0149368	Garfield	1270.0
Meadowlark Farms, Inc.	U6733	Garfield	5120.0
	U6740	Garfield	4320.0
	U9238	Garfield	1920.0
Mountain States Resources	U 5146	Sevier	2563.32
R.J. Hollberg	U7958	Emery	3794.49
Sun Oil Company	U5666	Garfield	3680.0
	U5667	Garfield	5120.0
	U5668	Kane	4454.00
	U5669	Kane	5120.00
Utah International Inc.	U675	Kane	560.0
Utah Power & Light	U1362 *	Kane	2553.0
	U1363 *	Kane	1883.0
	U1375 *	Kane	2306.0
	U5233 *	Kane	2500.0
	U5234 *	Kane	1440.0
	U5235 *	Garfield	2560.0
	U5236 *	Garfield	2560.0
	U5237 *	Garfield	2523.0
Woods Petroleum Co.	U6652	Garfield	4203.0
	U6653	Garfield	4926.0
	U6654	Garfield	4480.0

* PRLA's subject to special exchange provisions of PL 95-544.

TABLE 18

UTAH POWER & LIGHT CO. EXPRESSIONS OF INTEREST FOR NEW LEASE SALE AND EXCHANGE

Adjacent to existing development	Coal Requested				Area of Interest Geographic area
	Recoverable tons MM		Acres M		
	Surface	Underground	Surface	Underground	
Near	-	+75	-	22.25	North Horn Mtn.
Yes	-	+21	-	2.40	Lower Cottonwood
Yes	-	+ 6	-	.64	Meetinghouse Canyon
No	-	+70	-	+11.00	Trail Mountain
No	-	+100	-	14.70	Crandall Canyon
No	-	+12	-	2.00	Ferron (Olson)
No	-	+250	-	26.00	Muddy-Link Canyon

Source: DOI, Office of Coal Leasing Policy, Expressions of Leasing Interest in Coal Received August 23-October 26, 1979, for Water Planning in San Rafael Planning area, and Ferron-Price National Forest Planning Unit of Uinta Southwestern Coal Region.

SOUTHERN UTAH COAL DEVELOPMENT

The Southern Utah coal fields are perhaps the last large area of undeveloped coal reserves outside of Alaska. Existing federal leases and PRLA's on the Kaiparowits Plateau alone have more than 4.4 billion tons of in place coal reserves. Existing federal leases in the Alton field have more than 475 million tons of in place reserves. Although these reserves are a promising source of supply for the nation's future energy needs, coal development in Southern Utah in the next decade has a very cloudy future. Environmental opposition to construction of new mines and power plants in this region has frequently been cited as the major reason why coal development has not taken place. While environmental opposition is strong, the lack of the necessary transportation systems and of any firm market for the area's production have probably been more determinative.

Over the next year, several decisions are expected that could change the prospects for large scale coal development in Southern Utah. A decision whether or not to proceed with construction of the Allen Warner Valley Energy Complex should be reached by the project sponsors and federal and state agencies. The Department of the Interior will make a final decision on the unsuitability petition covering the proposed Alton Strip Mine area. The Environmental Protection Agency will have promulgated regulations governing the protection of visibility in Class I clean air areas. The joint Federal-State Kaiparowits Coal Development and Transportation study will be completed, thus laying the groundwork for further consideration of the requirements for and the impacts of construction of new mines and coal transportation systems in Southern Utah.

Allen Warner Valley Energy System

The level and timing of coal development in southern Utah hinges in large part upon the coal needs of the proposed Allen Warner Valley Energy System (AWV). The Alton strip mine is the proposed source of supply for 10.5 million tons per year of coal, on average, for the two power plants in the system. The Alton tract consists of federal and state coal leases held by Nevada Electric Investment Company, a subsidiary of Nevada Power Company, and Utah International Inc. The field has sufficient reserves to fuel the plants for more than 35 years. Utah International would operate the mine.

The Allen Warner Valley Project is a joint project of Nevada Power Company, Pacific Gas and Electric Company, Southern California Edison Company, and the City of St. George, Utah. AWV would consist of the Alton mine and preparation plant, 2 coal slurry pipelines totaling more than 180 miles in length, the 2-unit 500 MW Warner Valley Station, near St. George, Utah, the 4-unit 2000 MW Harry Allen Station, near Las Vegas, associated transmission lines, and a dam and reservoir in Warner Valley. About 90% of the power generated would serve California markets. A map of the system is included at the end of this section.

Further documentation of potential impacts and the resolution of several legal, political and economic issues are required before a final decision on the system will be reached. The AWV EIS is expected to be released in November, 1980: it will consider alternative coal sources and the possible impacts of underground mining at Alton. Although the Alton Mine was discussed in the earlier Southern Utah Regional Coal Environmental Statement, the statement's treatment of potential impacts was found to be

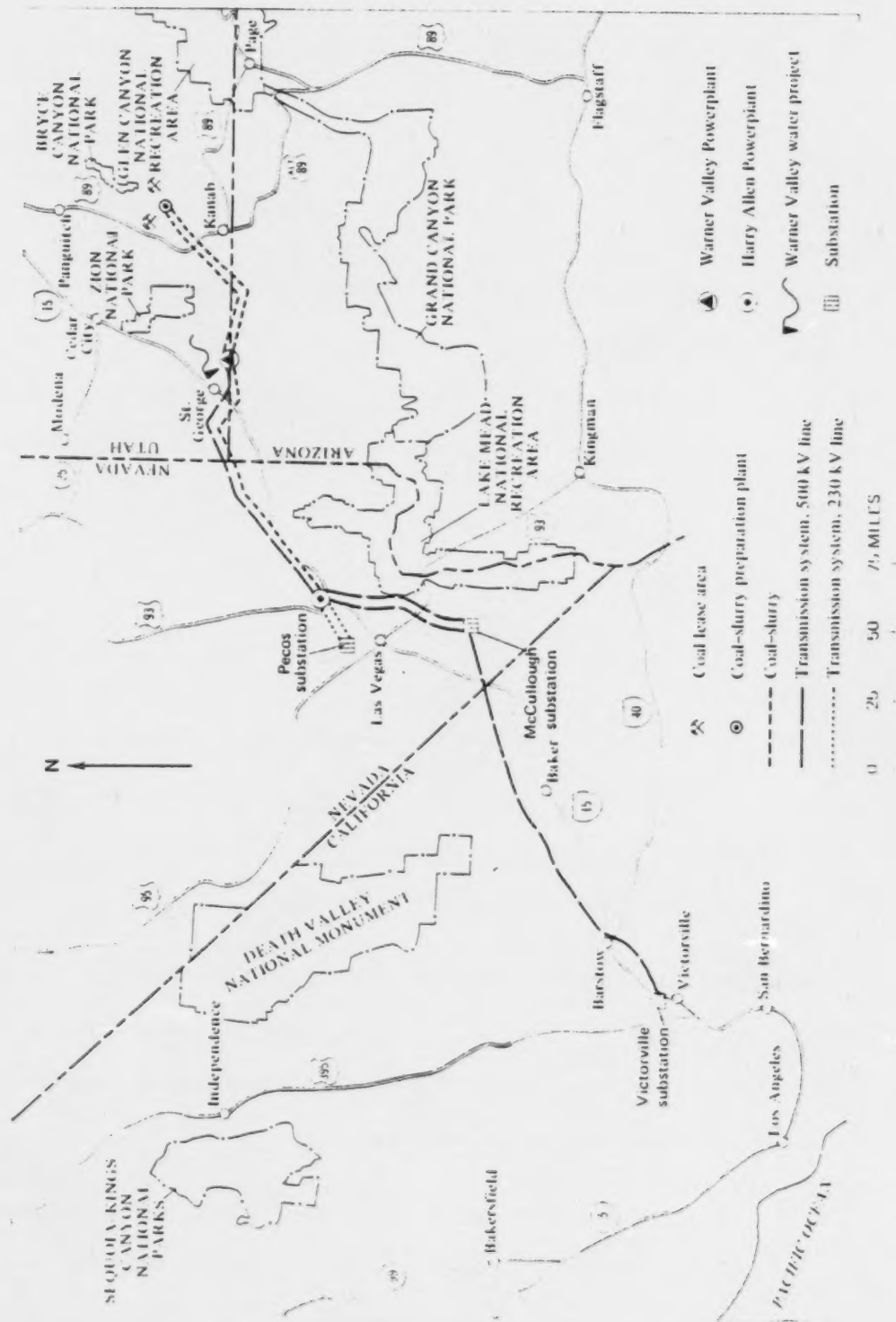
inadequate by several federal agencies. A cooperative federal state environmental assessment was proposed by the California Public Utilities Commission which must undertake its own environmental impact studies before it can approve the California Utilities participation in the project. The cooperative approach was rejected by the BLM because of irreconcilable differences in the proposed study agreement.

The Office of Surface Mining must approve a mine plan for the Alton operation near Bryce Canyon National Park. The lessees, Utah and International, Inc. and Nevada Electric Investment Co., have not yet submitted a mining and reclamation plan but have undertaken extensive background studies. OSM must also rule on the unsuitability petition filed under section 522 of SMCRA by a coalition of national environmental groups and area residents. A final decision is expected in November 1980. The lessees are not expected to submit a mine plan until after the EIS and unsuitability decisions have been made.

AWV has been proposed as a critical energy facility to receive expedited treatment by Federal agencies under the President's Critical Energy Facility Program established by executive order in the spring of 1979. The program is directed by OMB and would establish deadlines for Federal permit decisions and promote interagency cooperation.

The proposed slurry pipeline project would require large amounts of water from an area that is already experiencing water availability problems. The pipelines would export water from Utah to the power plants in Nevada. At present, there are legal restrictions on transferring water out of state.

Most importantly, the AWV project backers must find a secure market for the power generated. Electric power demand has grown less than anticipated in the market region. Extensive delays in construction and operation could increase costs and reduce the attractiveness of the investment.



- Map showing proposed Allen-Warner Valley energy system.

Alton Strip Mine Unsuitability Petition

On November 28, 1979, a coalition of national environmental groups and local residents filed an unsuitability petition under section 522 of the Surface Mining Control and Reclamation Act (SMCRA). This petition is the first major test of the Act's unsuitability provisions.

At issue are possible disruptions in water supplies, displacement of grazing activities, the destruction of the community of Alton, and the degradation of visibility and air quality in an area encompassing Bryce Canyon National Park, the Dixie National Forest, and the Pink Cliffs of the Paunsaugunt Plateau.

The petition alleges that:

- (1) the lands cannot be reclaimed as required by SMCRA;
- (2) surface mining operations could result in significant damage to important historic, cultural, scientific, and aesthetic values and natural systems of fragile lands, including national parks and forest lands; and
- (3) the operations could result in a substantial loss or reduction of long-range productivity of water supply or of food or fiber products, including damage to aquifers and recharge areas of renewable resource lands.

The petition and supporting information were found to be complete by the OSM on December 27, 1979 and a multi-agency review process was initiated. As the lead agency, OSM is coordinating the efforts of the BLM, the Forest Service, the National Park Service, and the Environmental

Protection Agency in conducting independent investigations and analyses of the possible impacts alleged in the petition.

A draft EIS on the petition is expected in June, 1980 and a final EIS is due for release in October, 1980. Public hearings are scheduled for September, 1980. The Secretary's final decision will be made by November 1980. Under SMCRA, the Secretary could designate all or part of the area as unsuitable for surface mining operations (including the surface effects of underground mining).

The decision on the unsuitability petition is the most important site-specific factor affecting the immediate development prospects of the 28 Nevada Electric and Utah International leases comprising the Alton mine.

The period required to review the unsuitability petition is not expected to increase the time required to open the Alton mine since no mine plan has been submitted. Perhaps more important to Alton development is the decision on the Allen Warner Valley complex. The OTA Task Force uniformly agreed that Alton would be developed only as a captive operation; it would not serve as a fuel source for IPP because transportation costs would be prohibitive.

Southern Utah Coal Production and Transportation Study

BLM and the state of Utah are conducting a joint study of potential environmental and socioeconomic impacts of planned coal development and transportation in 3 leased areas in southern Utah: Alton, Northern Kaiparowits, and Southern Kaiparowits. Preliminary results of the background analysis will be available in late spring of 1980. The analysis of possible transportation corridors for southern Utah coal will be issued later. The study is designed to provide both state and federal agencies with the baseline environmental and socioeconomic information required to evaluate actual proposals for transportation systems rights-of-way and to advise applicants of potential problems. The study will serve primarily as a regional planning tool and will contain no policy recommendations. It will not address market issues, project transportation costs, or evaluate specific routes.

The study will evaluate the impacts of 3 different development scenarios. The three scenarios selected are:

<u>Geographic Coal Lease Area</u>	Coal Production Levels (in million tons per year)		
	<u>Low</u>	<u>Medium</u>	<u>High</u>
Alton	2	9	9
North Kaiparowits	1	15	30
South Kaiparowits	2	30	45
TOTALS	5	54	84

Truck Haul Routes

Alton to Cedar City (via Highway 14)
Milford (via Highway 20)
Salina (via Highway 89)
Navajo Power Plant (east of Page, Arizona)
Warner Valley Power Plant (south of Hurricane, Utah)

North Kaiparowits to Milford (via Highways 12, 89, and 20)
Salina (via Highways 12 and 89)

South Kaiparowits to Cedar City (via Highway 14)
Flagstaff (via Highway 89)
Navajo Power Plant
Warner Valley Power Plant

Geographical Coal Lease Areas

Alton
North Kaiparowits
South Kaiparowits

Possible Corridor Directions Railroads and Coal Slurry Pipelines

northwest, west, south
north, south, west, northwest
north, south, west, northwest

In developing its scenarios, the BLM's project team considered the amount of coal production needed to justify the transportation investment and included estimates of projected production from each lease that would be needed to meet diligence requirements. Preliminary findings indicated that the 20-40 Mty scenario is most likely, since backers of the proposed rail and slurry lines have estimated that a total of 30 to 40 million tons of annual production would be needed to support the system.

Air Quality and Visibility Impacts from Coal Development

Within a 250-mile radius of the Kaiparowits Plateau in Southern Utah lie 8 national parks, 26 national monuments, 3 national recreation areas, 2 historical sites and 1 national memorial. Concern over the potential impacts to these federal conservation areas from coal mine and power plant development led to provisions in the Clean Air Act Amendments of 1977 that would protect the pristine air quality and visibility values in these national resource areas. The Southern Utah Coal region has 5 Mandatory Class I clean air areas--Arches, Bryce Canyon, Canyonlands, Capitol Reef, and Zion National Parks--where visibility has been found to be an important value. The provisions of the Clean Air Act and implementing regulations impose stringent requirements on pollution sources that are within or affect Mandatory Class I areas. The Act authorizes EPA to require that existing sources be retrofitted with pollution control equipment to prevent or minimize visibility impairments.

National Park Service activities illustrate the high level of concern for the potential air quality and visibility impairments that may stem from the proposed Alton strip mine, the coal source for planned 2500 MW Allen Warner Valley energy system. The Park Service is conducting an intensive review of possible impairments to scenic outlooks from neighboring Bryce Canyon National Park, having determined that impacts were understated in the site-specific southern Utah Environmental Statement. The NPS study will contribute to the review of the Alton unsuitability petition and preparation of the Allen Warner Valley EIS.

The Park Service is also developing baseline data and regional dispersion models for the Kaiparowits Coal Transportation Study. The Park

Service actively monitors air quality in the Four Corners Region of Utah, New Mexico, Colorado and Arizona and is developing a definition of "integral vistas" to protect uniquely scenic areas outside of but within sight of parklands.

No federal standards to control visibility impairments currently exist. On May 22, 1979, EPA published its proposed rulemaking on visibility protection for Federal Class I areas. The proposed rules require the installation of Best Available Retrofit Technology (BART) on existing major stationary sources to remedy existing and prevent future visibility impairment. Large coal-fired steam electric plants and coal cleaning plants are among the stationary sources covered by the proposed requirement. EPA plans to promulgate final standards by November, 1981. Utah, as well as the other federal coal lease states, are awaiting EPA guidance before developing their own standards.

APPENDIX

TECHNOLOGY ASSESSMENT BOARD

MORRIS K. UDALL, ARIZ., CHAIRMAN

TED STEVENS, ALASKA, VICE CHAIRMAN

EDWARD M. KENNEDY, MASS.

ERNEST F. HOLLINGS, S.C.

ADLAI E. STEVENSON, ILL.

ORRIN G. HATCH, UTAH

CHARLES MCC. MATHIAS, JR., MD.

GEORGE E. BROWN, JR., CALIF.

JOHN D. DINGELL, MICH.

LARRY WINN, JR., KANS.

CLARENCE E. MILLER, OHIO

JOHN W. WYDLER, N.Y.

JOHN H. GIBBONS

Congress of the United States

OFFICE OF TECHNOLOGY ASSESSMENT

WASHINGTON, D.C. 20510

JOHN H. GIBBONS

DIRECTOR

DANIEL DE SIMONE

DEPUTY DIRECTOR

APPENDIX A

FEDERAL COAL DEVELOPMENT RIGHTS
UTAH TASK FORCE PARTICIPANTS

University Club Building
Salt Lake City, Utah
February 25-29, 1980

Mr. Gordon Anderson
Colorado Plateau Representative
Friends of the Earth

Mr. James Cannon
Executive Director
Citizens for a Better Environment

Dr. Wayne Cook
Department of Range Science
Colorado State University

Mr. Ron Daniels
Chairman, State Coal Leasing Task Force
Utah Department of Natural Resources

Dr. Hellmut Doelling
Utah State Geological & Mineral Survey

Mr. John Garr
Member - Utah State Legislature
Coastal States Energy Corporation

Mr. Frank Hachman
Associate Director
Bureau of Economic & Business Research
University of Utah

Mr. Dan Kimball
Office of Surface Mining Region V

Mr. Jack Moffitt
Area Mining Supervisor
U.S. Geological Survey

Mr. Lyman Moore
Bureau of Land Management
Utah State Office

Mr. Robert Moore
Counsel - Utah Coal Operators Assoc.

Mr. Max Nielson
Bureau of Land Management
Utah State Office

Mr. Ken Riddle
Utah Department of Transportation

OBSERVERS

Mr. C. Ted White
Government Affairs
Pacific Gas & Electric

Ms. Carol Senden
Office of Coal Management
Bureau of Land Management
Washington, D.C.

Mr. John Stephenson
Bureau of Land Management
Utah State Office

OTA

Dr. James Boyd
Project Advisory Panel

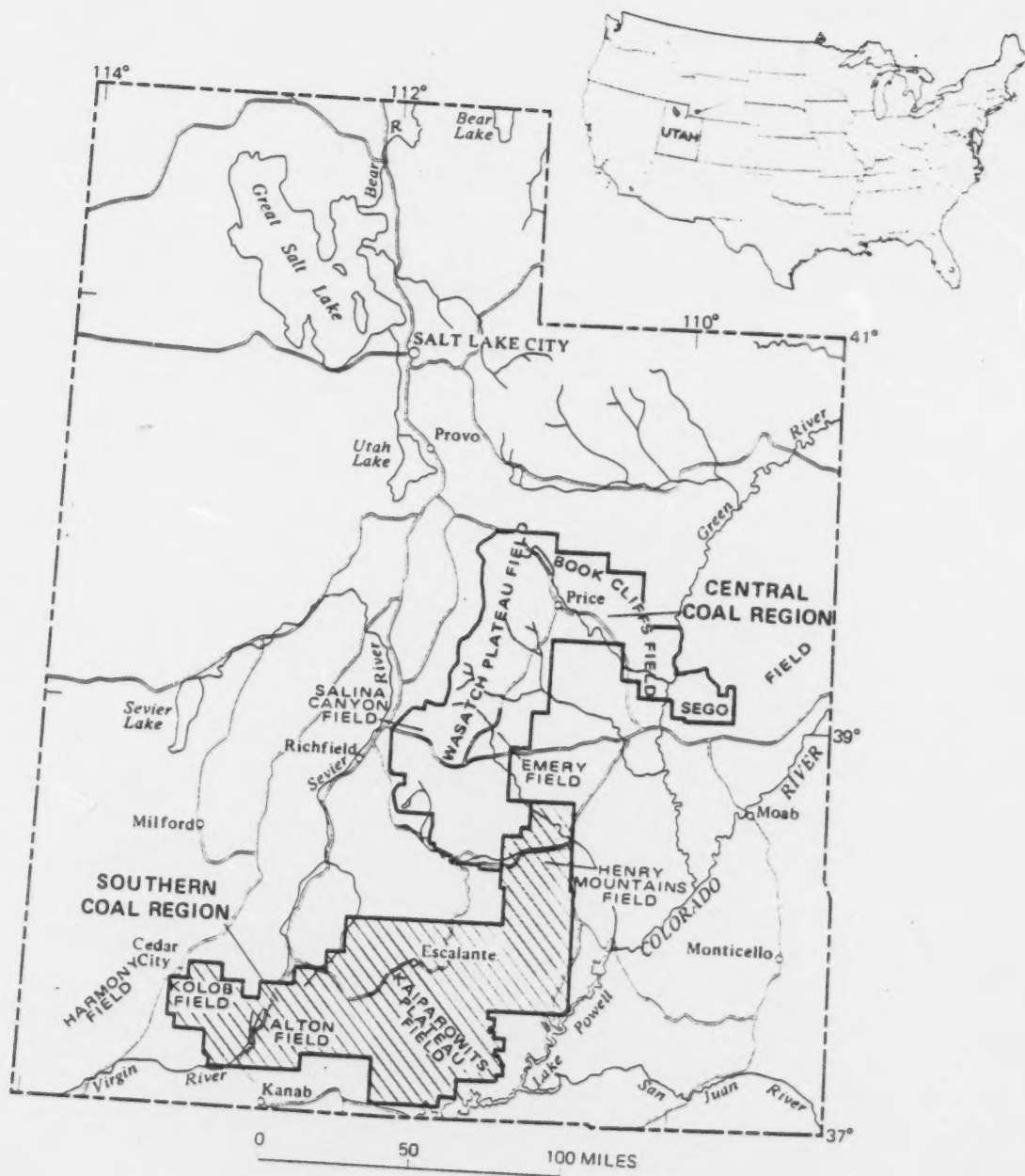
Dr. Audrey Buyrn
Program Manager, Materials

Dr. Frank J. Wobber
Project Director

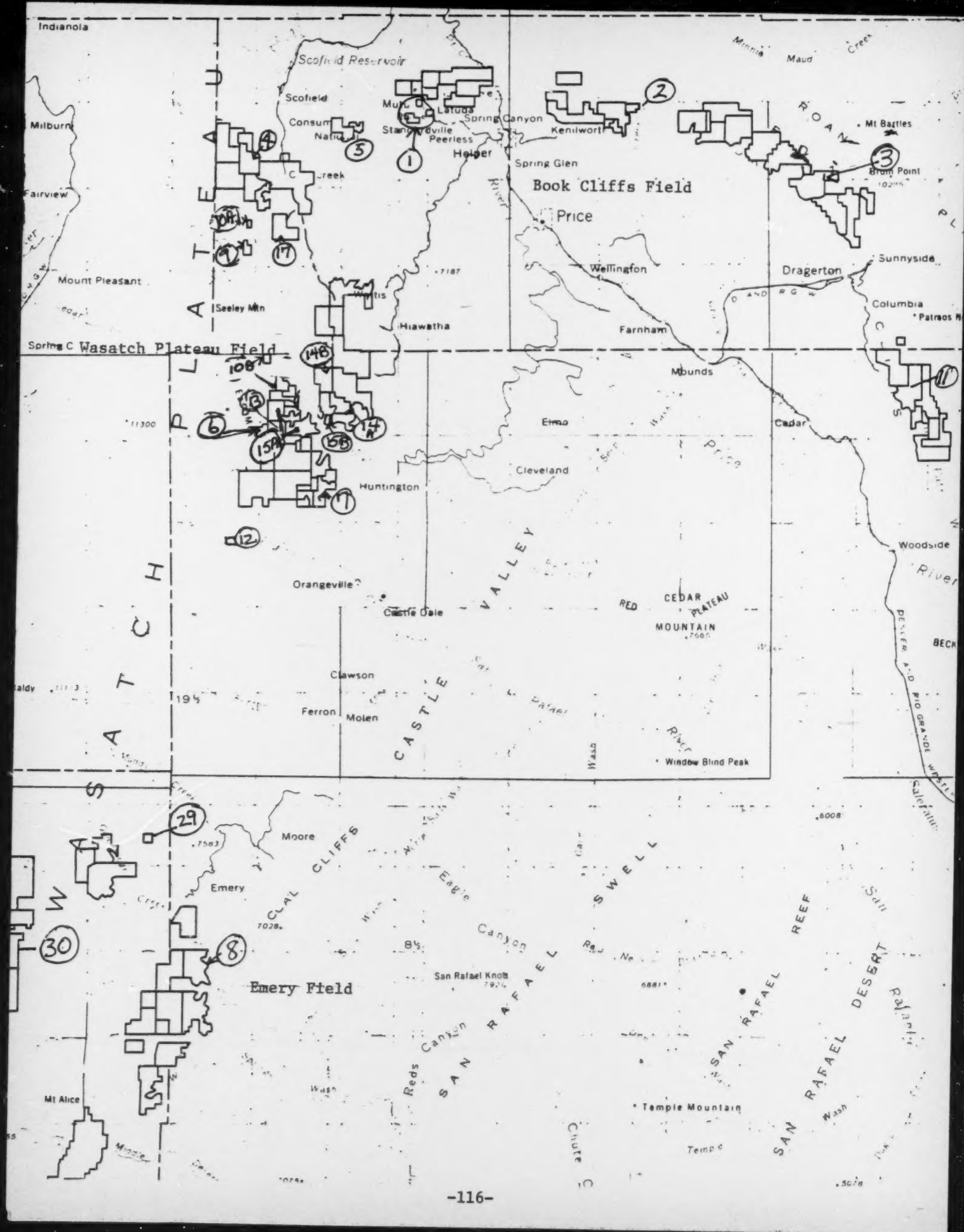
Ms. Karen L. Larsen
Assistant Project Director

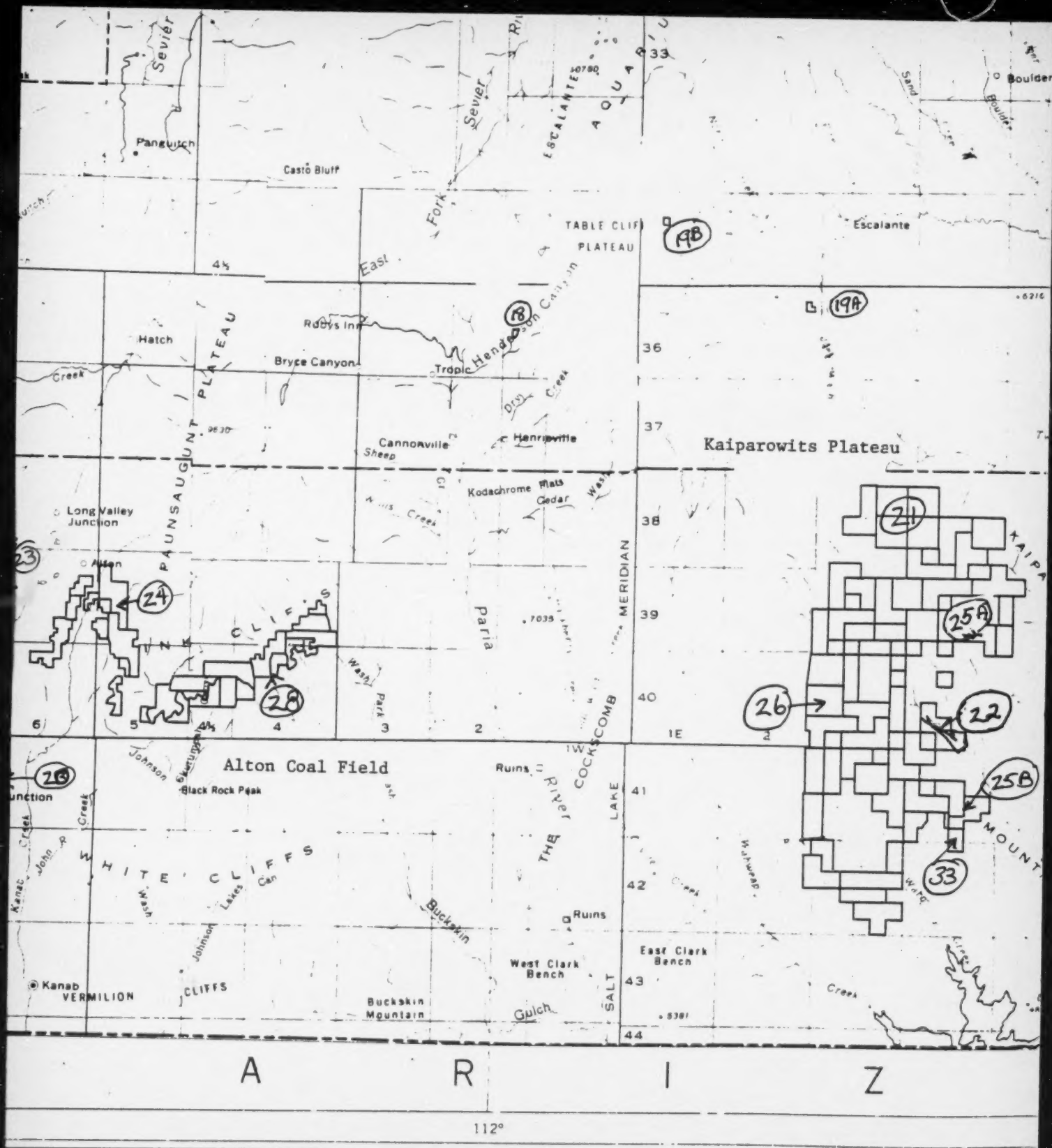
Ms. Nancy Greenebaum
OTA Staff Consultant

APPENDIX B
MAPS OF
UTAH COAL FIELDS AND UNDEVELOPED FEDERAL LEASES



-Index map showing southern and central Utah regions and principal coal fields.





APPENDIX C
FEDERAL COAL LEASES IN UTAH
DEVELOPMENT STATUS INDEX

FEDERAL COAL LEASES IN UTAH
September 30, 1980

UTAH - Uinta Region

Block #	LESSEE; PARENT/SUBSIDIARY	LEASE BLOCK OR MINE NAME	MINE PLAN STATUS	NUMBER OF LEASES	SERIAL NUMBER	DATE	ACRES	COUNTY
	American Electric Power Co./Franklin Real Estate Co.	Braztah No. 3, 5, 6&7	Approved	11	U058184 SL071737 U25484 U019524 U0148779 U0146345 SL046652 SL048442 SL029093 U25683 U25485	6/17/21 9/1/50 6/17/21 6/1/57 8/1/66 11/1/65 8/3/21 11/21/30 6/17/21 12/1/79 9/1/50	694 1960 634 645 1240 1160 802 2563 1284 1173 543 12699	Carbon
	Atlantic-Richfield Co./Beaver Creek Coal Co.	Gordon Creek No. 2	Approved	1	U8319	3/1/70	962	Carbon
9	Atlantic-Richfield Co./Beaver Creek Coal Co. --Intermountain Exploration, Inc. a/	Huntington Can- yon No. 4 & 5	Approved	3	SL064903 U33454 SL050641	1/24/46 12/1/78 12/6/38	160 440 160 760	Emery
	Bell, John L./--	Trail Mountain	Approved	1	U082996	7/1/62	80	Emery
	California Portland Cement Co./--	Soldier Canyon	Approved	1	SL051279	1/4/35	1548	Carbon
	The Coastal Corp./Coastal States Energy Co.	Convulsion Canyon (SUFCO)	Approved	4	SL062583 U062453 U0149084 U28297	9/11/41 3/1/62 3/1/66 1/1/79	2200 480 240 2632 5552	Sevier
	Getty Oil Co./Plateau Mining Co.	Star Point No. 162	Approved	4	U7949 SL031286 U37045 U13097	9/4/23 9/1/70 4/1/80 5/1/74	1631 240 698 1360 3929	Carbon
	Kaiser Steel Corp./--	Sunnyside No. 1, 2&3	Approved	2	SL062966 U32083	11/12/43 3/1/79	1367 476 1843	Carbon

a/ Lease held by Intermountain Exploration was considered by OTA task force as an undeveloped lease; it was later included in the mine plan for Beaver Creek's Huntington Canyon mines.

UTAH - Uinta Region (continued)

Block #	LESSOR: PARENT/SUBSIDIARY	LEASE BLOCK OR MINE NAME	MINE PLAN STATUS	NUMBER OF LEASES	SERIAL NUMBER	DATE	ACRES	COUNTY
	Quaker State Oil Refining Co./Kanawha & Hocking Coal & Coke Co. --McKinnon, Arameda/-- --McKinnon Marital Trust/--	Belina No. 162	Approved	3	U017354* U044076** U020305***	9/1/56 9/1/65 9/1/56	1028 2168 1439 (1346 adj.)	Emery Carbon
	Quaker State Oil Refining Co./Kanawha & Hocking Coal & Coke Co. --McKinnon Marital Trust/--	Skyline	Approved	5	U073120 U0142235 U0147570 U020305*** U044076**	2/1/64 10/1/64 5/1/66 9/1/56 9/1/65	557 520 2093 1439 2368 (6335 adj.)	Carbon Carbon Emery
	--McKinnon, Arameda/--							
	Sharon Steel Corp./U.S. Fuel Co.	Hawatha	Approved	3	SL025431 SL069985 U026583	2/8/23 11/1/49 2/1/61	2370 2356 1000 5726	Emery
	Utah Power & Light Co./--	Des-Bee-Dove	Approved	3	U02664 SL050133 SL066116	1/1/57 8/1/33 6/1/55	920 80 400 1400	Emery
	Utah Power & Light Co./-- --Cooperative Security Corp./-- --McKinnon Marital Trust/--	Deer Creek- Wilberg	Approved	9	U1358 SL064607 SL064900 U040151 U083066 U044025 U084923 U084924 SL070645	8/1/67 10/4/46 2/3/45 1/3/62 1/3/61 1/8/60 8/1/64 8/1/64 4/1/52	320 614 160 1720 1285 40 2252 1211 2560 11362	Emery
	U.S. Steel Corp./--	Geneva	Approved	2	SL046612 SL066145	4/2/29 6/19/46	280 1552 1832	Carbon

*Lease U017354 is also in the pending O'Connor mine plan.

**Approximately 337 acres of lease U04476 is in the Belina Mine; the remainder is in the approved Skyline mine plan and in the pending O'Connor mine plan.

***About 960 acres of lease U020305 is shared by Belina Mine and the pending O'Connor Mine; the remaining lease areas are in the Skyline Mine.

UTAH - Uinta Region (continued)

Block#	LESSEE: PARENT/SUBSIDIARY	LEASE BLOCK OR MINE NAME	MINE PLAN STATUS	NUMBER OF LEASES	SERIAL NUMBER	DATE	ACRES	COUNTY
	AMCA Resources, Inc./AMCA Coal Leasing, Inc.	Pinnacle	Pending	3	SL027304 SL063058 U010581	9/1/25 8/3/42 2/1/56	120 240 1682 2042	Carbon
	Conoco, Inc./Consolidation Coal Co.	Emery Deep	Pending	1	U5287	7/1/70	720	Emery
	Energy Reserves Group, Inc./--	Skumpah	Pending	1	U0141177	3/1/67	2504	Sevier
	Mountain States Resource Corp./--	Ute No. 142	Pending	1	U5135	5/1/77	8824	Sevier
	Pacific Gas & Electric Co./Eureka Energy Co.	Sage Point- Dugout Canyon	Pending	5	U07746 U089096 U092147 U0144820 U07064	6/3/57 7/1/62 12/1/62 9/1/66 1/1/57	2480 480 680 2212 2416 8268	Carbon
	(Sold to Sun Co. 12/81)							
	Quaker State Oil Refining Co./Kanawha & Hocking Coal & Coke Co. --McKinnon, Armda/-- --McKinnon Marital Trust/--	O' Connor	Pending	4	U067498 U017354* U044076** U020305**	1/1/62 9/1/56 9/1/65 9/1/56	502 1028 2368 1439 (944 ad j.)	Carbon
5	U.S. Steel Corp./--	B Canyon	Pending	1	SL068754	6/1/51	2571	Carbon
17	Wasatch Coal Co./-- b/	C and W No. 1	Pending	1	SL063011	11/28/41	280	Carbon
	Atlantic Richfield Co./Beaver Creek Coal Co.	Clear Creek	Undeveloped	1	U020641	5/1/61	1909	Emery
1	Carbon Emery Bank/--	--	Undeveloped	3	SL063720 U024314 U08606	12/17/42 1/1/58 10/1/53	200 37 40 277	Carbon
6	Carroll County Coal Co./--	--	Undeveloped	1	U07653	9/1/70	412	Emery

*Lease U017354 is also in the approved Belina Mine (see preceding page).

**Leases U044076 and U020305 are shared with the approved Belina and Skyline mines (see preceding page).

b/ Mine plan submitted after Utah task force report was completed.

UTAH - Uinta Region (continued)

Block #	LESSOR: PARENT/SUBSIDIARY	LEASE BLOCK OR MINE NAME	MINE PLAN STATUS	NUMBER OF LEASES	SERIAL NUMBER	DATE	ACRES	COUNTY
8	Conoco, Inc./Consolidation Coal Co. and Gulf Oil Corp./Kemper Coal Co.	-- Emery	Undeveloped	9	U073040 U073041 U0101213 U0101214 U0101215 U0101217 U0101218 U090231 U073039	6/1/62 6/1/62 6/1/65 6/1/65 6/1/65 6/1/65 6/1/65 11/1/62 6/1/62	2542 2558 2162 2314 856 640 1880 2497 2577 20603	Emery Sevier
15b	COP Coal Development, Inc./--C/	Rilda Canyon	Undeveloped	1	U024318	5/1/58	80	Emery
14b	COP Coal Development, Inc./--C/	--	Undeveloped	1	U024316	5/1/58	1400	Emery
29	The Coastal Corp./Coastal States Energy Co.	--	Undeveloped	1	U053995	3/1/62	169	Sevier
30	Energy Reserves Group, Inc./--	--	Undeveloped	3	U0141171 U0141176 U0141178	3/1/67 3/1/67 3/1/67	1825 1544 1976 5345	Sevier
10A 10B	Gent's Flying Enterprises/--	--	Undeveloped	1	SL050655	11/17/38	80	Emery
3	Gent's Flying Enterprises/-- Kaiser Steel Corp./--	Tip Top North Block	Undeveloped	1 2	SL062648 U02785 U039706	1/3/41 7/1/52 7/1/60	80 2360 2559 4919	Emery Carbon
11	Kaiser Steel Corp./--	South Block	Undeveloped	6	SL066490 SL069291 U0126947 U0126948 U014217 U014218	12/31/47 4/1/50 12/1/63 12/1/63 2/1/55 2/1/55	2440 600 1992 2523 456 320 8331	Emery

c/ Lease blocks were assigned and subdivided after task force.

UTAH - Uinta Region (continued)

Block #	LESSEE: PARENT/SUBSIDIARY	LEASE BLOCK OR MINE NAME	MINE PLAN STATUS	NUMBER OF LEASES	SERIAL NUMBER	DATE	ACRES	COUNTY
7	Kingston, Charles/--	--	Undeveloped	1	U022918	4/1/58	120	Emery
13	McKinnon Marital Trust/--	--	Undeveloped	1	SL050862	8/5/37	280	Emery
14a	Nevada Power Co./Nevada Electric Investment Co.	--	Undeveloped	2	U020668 U38727	5/1/58 5/1/58	627 740 1367	Emery
14b2	Northwest Energy Corp./Northwest Carbon Co.	--	Undeveloped	1	U46484	5/1/58	400	Emery
2	Pacific Gas & Electric Co./Eureka Energy Co.	--	Undeveloped	1	U05067	6/1/52	320	Carbon
4	Quaker State Oil Refining Co./Kanawha & Hocking Coal & Coke Co.	Utah No. 2	Undeveloped	1	SL062605	3/17/39	1053	Carbon
16	Smith-Holladay and Associates, Ltd/--	--	Undeveloped	1	U2810	10/1/67	80	Emery
15A	Utah Power & Light Co./--	--	Undeveloped	5	SL051221 U014275 U024317 U024319 U06039	8/1/33 10/1/55 5/1/58 5/1/60 5/1/53	80 80 400 1040 1360 2560	Emery
12	Wilberg, Eliza and Lloyd/--	--	Undeveloped	1	SL036407	9/10/26	80	Emery

c/ Lease blocks were assigned and subdivided after task force.

UTAH - Southwestern Region (continued)

Block #	LESSEE: PARENT/SUBSIDIARY	LEASE BLOCK OR MINE NAME	MINE PLAN STATUS	NUMBER OF LEASES	SERIAL NUMBER	DATE	ACRES	COUNTY
18	Denton, Charles and Fulton, Caesar/--	--	Undeveloped	1	SL071561	3/1/51	80	Garfield
22	The El Paso Co./El Paso Natural Gas Co.	--	Undeveloped	1	U083000	12/1/64	1440	Kane
19A	Frandsen, George/--	--	Undeveloped	1	SL048223	4/5/30	120	Garfield
19B	Frandsen, George/--	--	Undeveloped	1	SL050638	5/10/41	40	Garfield
31	Hiko Bell Oil & Mining Co./-- d/	South Nipple Butte	Undeveloped	3	U0118366 U0120794 U0146654	11/1/65 3/1/66 12/1/65	1920 1920 2560 6400	Kane
23	King Cannel Coal Co./--	--	Undeveloped	1	SL050619	6/1/38	240	Kane
25A	Peabody Holding Co./Peabody Coal Co.	--	Undeveloped	9	U0103108 U0103131 U0103132 U0103133 U0115656 U0115657 U096476 U096477 U098786	3/1/67 4/1/67 4/1/67 4/1/67 11/1/67 11/1/67 3/1/67 3/1/67 3/1/67	2560 2560 1272 1273 2560 2560 2552 1277 2550 19164	Kane Kane
25B	Peabody Holding Co./Peabody Coal Co.	--	Undeveloped	3	U0101140 U0101141 U0113254	4/1/67 4/1/67 8/1/67	1600 1760 160 3520	Kane
20	Rasmussen, A./--	--	Undeveloped	1	SL049042	8/14/37	40	Kane
27	West, S.R./--	--	Undeveloped	1	U0103141	9/1/67	961	Kane

d/ Hiko Bell South Nipple Butte Mine Plan was included in Southern Utah Regional Coal Environmental Statement and was not considered by OTA Utah Task force. It was classified as undeveloped after the task force because a mining plan was not submitted to the Office of Surface Mining by the lessee.

FACTORS FOR THE TASK FORCE TO CONSIDER IN
ASSESSING DEVELOPMENT POTENTIAL

1. Market

Issues relating to the sale of coal produced in the region or from specific mines in the region.

2. Resources and Reserves; Location and Siting

Characteristics and issues related to geologic, geographic, and engineering considerations affecting the potential mine site and the regional conditions that affect the overall favorability or unfavorability for coal mining in that region.

3. Transportation

Issues and characteristics affecting the ability to move coal produced in this region to market or to end use facility.

4. Ownership

Issues and characteristics related to the ownership of the lease and the surface and mineral rights of contiguous lands.

5. Legal/Institutional

Considerations related to federal, state, or local laws, regulations, and policies and those related to the social, political, economic and physical environment in which lease development is to take place. Specifically:

- Land Management
- Surface Resources
- Air Quality
- Water Availability and Quality
- Community and Socioeconomic

The following pages discuss these factors in more detail. The factors are not listed in order of importance for lease development. We expect that the order and detail in which they are addressed will vary from region to region. A set of questions to guide thinking for each factor is presented.

Questions to be Considered in Evaluating Coal Development Prospects

Market Factors

1. What is an existing market for coal from this region? Where is the coal conserved?
2. What are the mid-term and short term load projections for coal from this region? (About the same, increased production, decreased production)
3. What are the implications of the current and projected marketability of coal from this region for existing mines? For undeveloped leases?
4. Can this lease/lease tract reasonably be expected to compete for a share of the projected market for coal from this region? Can coal be produced at or near the projected FOB price to be competitive?
5. If the lease is part of a captive operation, where will the coal be used? Is it expected that the coal will be produced at less than, equal to, or more than the projected market price for coal in this region?

Location-Siting and Resources/Reserves Base

1. What are the resources/reserves and acreage requirements for developable properties in this region? (Mine type, mine life, recovery rate, mine size, associated mine site and processing facilities' requirements)
2. Are there any general siting or location factors that make lease development in this region more favorable, less favorable, or more or less uncertain than other coal mining regions? (e.g., checkerboard lands, proximity to park or wilderness area, local attitudes toward development)
3. What geo-engineering conditions in this region determine whether surface or underground mining methods are used?
4. Are there any topographic or physical features in this region that favor or constrain mine development? (e.g., surface outcrops, easy seam entry, deeply dissected terrain, steeply dipping seams)
5. Are there any severe geological and engineering conditions that reduce the recoverability of coal in place in this region? (e.g., burned out or mined out seams, stream channels, faulting, split or lenticular seams, roof conditions)

6. What supporting facilities are required for new or expanded mine development in this region? What facilities must be constructed prior to development, to production? (e.g., communications facilities, preparation plant, utilities, transportation.)

Transportation Factors

1. Is there adequate transportation service currently available to handle existing and projected coal traffic in this region?
2. What changes in the transportation availability in this region are required to provide adequate services for existing or projected production? New facilities, increased capacity, additions, improvements?
3. What is the current status of planned new or expanded transportation facilities to serve this region?
4. How do transportation costs and services affect the production of coal in this region?

Ownership Factors

1. Is the lessee generally considered to have the industry experience and or the financial capability to develop the lease?
2. Does the ownership history of the lease show a trend towards development?
3. What is the status of surface and mineral rights on contiguous lands -- federal, state, fee land?
4. Are the surface and mineral rights on the lease held by different parties? Is surface owner consent likely to be constraint on lease development in this region?

Legal-Institutional Factors

Land Management Considerations

1. What is the current mine plan status of the lease?
 - mine plan pending/and under review/mine plan pending/inactive conceptual mine plan considered in regional EIS/conceptual mine plan under discussion/inactive.

2. Are there any related applications or permits? Power plant siting, additional lease/PRLA applications, rights-of-way, special use permits?
3. What is the surface management status of the lease area? Public land, forest, private land, wilderness study area? Are there any special surface management conditions on lease developments?

Resource Considerations

1. What is the surface use classification or characteristics for lease and adjacent lands? (grazing, agricultural, forest, urban, recreation, wildlife habitat, non-classified)
2. Are there any special surface uses or characteristics that might conflict with lease development?
3. Are there any lease areas that could be covered by one or more of the criteria for lands unsuitable for mining under the Surface Mining Control and Reclamation Act and regulations?
4. Are there any lease areas where special operating requirements could be imposed under SMCRA - such as alluvial valley floors, prime farmland, etc.?
5. What are the overall prospects for reclaiming surface mined lands in this region to prior use or OSM performance standards? Describe the affecting reclamability, technological, resource, and environmental constraints or advantages such as slope, soil characteristics, water availability, etc.

Community and Socio-Economic Considerations

1. What is the overall capacity of the area to support mine development? Favorable/unfavorable/uncertain? What level of development threshold level can the area support without major disruptions or community-related constraints on development.
2. Does the region have an adequate trained labor force available to support mine development?
3. Does the region have the community and services infrastructure to support mine development and any associated increase in local population (e.g., roads, utilities, schools, recreation, labor force, housing)?

4. What, if any, are the expected areas of difficulty in accommodating mine-related growth in the affected communities? (Funding impact aid problems? Lack of facilities?)
5. How are community based constraints/needs included in decisions on mine development in this region?

Air Quality Factors

1. Are there any air quality related limitations on mine development in this region? (e.g., nonattainment of ambient air quality standards in the lease area, or adjacent areas? Class I or II clean air areas; potential visibility impacts)
2. What are the anticipated impacts on ambient air quality in the region from mining activities and associated facilities (e.g., processing plants, electric generating plants, coke ovens?)
3. What is the threshold level of development that the region can sustain without exceeding air quality standards? (e.g., estimated number of mines, coal burning power plants) What other sources are expected to contribute to emissions?

Water Availability and Quality Factors

1. What are the water availability and water quality constraints, if any, on mine development, processing facilities associated coal burning power plants or other related facilities or on community expansion?
2. What are the potential impacts of mine development and related facilities on water availability and water quality in the region? Consider both surface and ground water supplies (e.g., increase sediment load, TDS, runoff, leaching, aquifer intercepts, compacting water users).
3. What is the threshold level of development that the area can support without encountering major water availability or water quality problems?

APPENDIX E

U.S. DEPARTMENT OF ENERGY

The 1980 Biennial Update of National and Regional Coal Production Goals for 1985, 1990, and 1995

Table 2. Coal Production Goals for 1985, 1990 and 1995 by Western States (million short tons)^a

State	1985			1990			1995		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
E. No. Great Plains									
North Dakota	29.0	29.0	29.0	34.3	50.8	59.7	53.6	85.6	103.7
South Dakota	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.9
Eastern Montana	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total	29.3	29.3	29.3	34.6	51.1	60.0	53.9	87.8	105.9
Powder River Basin									
Montana	53.9	56.6	79.3	57.2	109.4	176.4	98.4	211.3	385.0
Wyoming	133.5	136.6	142.3	148.6	185.1	235.8	161.0	279.5	388.8
Total	187.4	193.2	221.6	205.8	294.5	412.2	259.4	490.8	773.8
Rest of Wyoming	55.3	57.8	66.7	59.5	71.4	81.6	74.1	104.4	130.1
Colorado	33.8	33.9	38.2	28.3	35.1	43.3	35.0	49.3	59.9
Utah	25.1	30.2	35.1	35.9	48.8	63.0	49.2	74.2	82.6
New Mexico	33.3	37.7	44.2	55.9	64.1	67.4	61.0	71.8	77.4
Central West	15.0	15.2	16.7	14.8	21.5	26.9	18.3	32.7	44.7
Gulf	69.7	69.7	70.1	121.9	151.6	209.7	161.7	213.5	213.5
Arizona	12.1	12.1	12.1	11.2	11.6	11.6	11.2	11.5	11.8
Northwest	3.4	4.2	3.7	4.7	5.3	6.2	5.4	6.7	7.2
Alaska	b	b	b	b	b	1.9	b	3.8	5.7
TOTAL	464.4	483.3	537.7	572.6	755.0	983.8	729.2	1146.5	1512.6

a) Some totals differ from corresponding totals in DOI Production Regions due to rounding.

b) Negligible

Table 6. Coal Production Goals for 1985, 1990, and 1995 by DOI Coal Production Regions (million short tons)

Region	1985			1990			1995		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
No. Appalachia	179.8	194.5	215.9	222.7	291.0	341.5	270.0	372.3	494.7
W. Appalachia	198.2	208.7	224.6	214.7	230.2	257.6	202.5	229.5	255.2
So. Appalachia	18.5	19.5	20.6	16.0	17.0	18.4	13.6	15.9	19.5
Eastern Interior	179.7	211.8	246.0	243.7	327.0	384.6	303.7	450.0	484.3
Western Interior	15.0	15.2	16.7	14.8	21.5	26.9	18.3	32.7	44.7
Fort Union	29.3	29.3	29.3	34.6	51.1	60.0	53.9	85.9	105.9
Powder River	187.1	193.2	221.6	205.8	294.3	412.2	259.1	490.9	773.8
Green River - Hams Fork	71.9	76.5	88.6	75.1	90.8	105.3	93.4	130.9	160.9
Uinta-S.W. Utah	16.4	41.4	47.1	45.8	60.5	76.7	60.8	89.2	101.2
Denver-Raton Mesa	5.3	6.3	7.8	4.2	10.5	14.3	7.4	18.4	24.2
San Juan River	31.9	35.4	40.7	54.5	57.6	58.9	57.6	61.2	63.7
Texas ^a	69.7	69.7	70.1	121.9	151.6	209.7	161.7	211.5	213.5
Total	1024.8	1101.5	1229.0	1253.8	1601.1	1966.1	1502.0	2190.4	2710.6

^a Includes Louisiana.

Source: U.S. Department of Energy, The 1980 Biennial Update of National and Regional Coal Production Goals for 1985, 1990, and 1995, March 1981.

Table 10. Comparison of Coal Production Goals to Selected State Production Forecasts for 1985 and 1990 (million short tons)^a

State	Actual 1979	1985			State Forecast	1990		
		State Forecast	Low	Goals Medium		Low	Goals Medium	High
North Dakota	15.0	38.7	29.0	29.0	71.1	34.3	50.8	59.7
Montana	32.5	81.2	54.2	56.9	130.2	57.5	109.7	176.7
Wyoming	71.8	146.5	188.8	194.4	167.5	208.1	256.5	317.4
Colorado	18.1	23.9	33.8	33.9	n.a.	28.3	35.1	43.3
New Mexico	15.1	47.0	33.3	37.7	57.5	55.9	64.1	67.4
Utah	11.8	18.0	25.1	30.2	28-44	35.9	48.8	63.0

^aState forecasts are not available for 1995.

Source: U.S. Department of Energy, The 1980 Biennial Update of National and Regional Coal Production Goals for 1985, 1990 and 1995, March 1981.

APPENDIX F

COAL LEASE SALES IN THE UINTA SOUTHWESTERN UTAH COAL REGION

DATE	LESSEE/BIDDER	CRITERIA	SERIAL NUMBER	ACREAGE	RECOVERABLE RESERVES (Million tons)
7/81	Utah Power & Light Co. Cottonwood Tract	RS	U-47978	3,347	23.12
	Kanawha Hocking Coal & Coke Gordon Creek Tract	RS	U-47975	4,284	26.0
	Kanawha Hocking Coal & Coke Miller Creek Tract	RS	U-47974	1,999	17.32
	Utah Power & Light Co. Meetinghouse Canyon Tract	RS	U-47979	1,063	12.4
	Bishopsgate Coal Co. Tucker Canyon Tract	RSSB	U-47973	160	0.84
2/82	Consolidation Coal Co. Kingston Tract	RS	U-5044	160	2.27

Key:

RS : Regional Sale
 RSSB: Regional Sale, Small Business Setaside

82

APPENDIX G

ISSUE PAPER

MARKET FACTORS ASSOCIATED WITH THE ASSESSMENT OF
THE DEVELOPMENT POTENTIAL OF FEDERAL COAL LEASES IN UTAH

This issue paper was prepared for the use of the OTA Coal Leasing Task Force in Utah. The views and conclusions contained in this paper are those of the author, Frank Hachman of the University of Utah, a member of the task force. The paper is included for background information only.

MARKET FACTORS ASSOCIATED WITH THE ASSESSMENT
OF THE DEVELOPMENT POTENTIAL OF FEDERAL COAL LEASES IN UTAH

Introduction

The economics of coal mine development and operation are only loosely associated with the often encountered data expressing magnitudes of "resources" or "reserves." The bulk of the existing stock, domestic or world-wide, is sufficiently large in comparison to present and expected rates of exhaustion that little value attaches to property claims on the resource independently of a consideration of its location. Obviously, coal-bearing properties of appropriate quality and location do command a price in anticipation of profitable, near-term production. But this price is not a present value derived from an expectation of higher future commodity prices arising out of physical exhaustion of the substance. Instead, the price for a coal-bearing property is the discounted rents that are expected to accrue from production given some superiority in location, extraction costs, or physical and chemical features of the particular coal.

In simplest terms; a mine will command a negligible price if its coal, in its nearest point of consumption, can only command a price sufficient to cover its costs of extraction and transportation. A mine with a superior coal, or lower costs of transportation and production, will have a market value to the extent that an owner can expect to receive a net cash flow arising from current and future production.

The complexities of imperfect information on future sales volumes, production conditions, prices, transportation charges; the possibilities

of changes in taxation, subsidization, environmental, or worker protection policies; and the costs of entry and exit from the industry clearly compound the simple case into the real world confrontation with the facts of uncertainty and bearing of risk. The histories of the mines and their operators that constitute the industry will be colored by all the complexity and unpredictability of individual behavior and the chance occurrences of windfall gains and losses. Still, there are three economic characteristics of coal mining as an industry that shape the development potential of federal coal leases in Utah, independently of the good or bad fortunes of any one enterprise.

These three centrally important features of the industry are that coal is (1) a low specific value commodity, (2) produced in a workably competitive industry, with (3) prices yielding scarcity rents that do not have a significant element occurring in anticipation of increasing prices resulting from exhaustion of coal deposits in general. For any specific lease, these characteristics will vary widely in the immediacy of their implications for the assessment of development potential. But these three features do structure closely the marketability of Utah coal.

The specific value of coal, one-fourth of a cent to one cent per pound at the mine, is a small fraction of the specific value of most of transported commodities. The obvious result is that transportation costs become a substantial portion of the delivered costs of coal. In particular even superior coal with lower production costs can be disadvantaged at the point of consumption by a coal that is simply produced at a closer location. The result is a geographical pattern of national production and consumption that is a consequence of relatively high transportation costs overriding even substantial differences in quality and costs of production.

The distribution of non-metallurgical coal from selected western districts during the first nine months of 1979 is presented in Table 1.¹ Districts 16 and 17 together constitute the coal producing counties of Colorado plus those in the extreme northeast corner of New Mexico. District 18 covers all coal producing counties in the remainder of New Mexico, all counties in Arizona, and California's negligible production. Districts 19 and 20 cover Wyoming and Utah, respectively.

The pattern shown varies somewhat from year to year as changes occur in market conditions. Still, these numbers from 1979 are typical of the structure of advantage and limitation and express the framework within which the major shifts may be occurring over time.

The distribution presented in Table 1 is translated in Tables 2 and 3 into percentage terms permitting direct comparisons between originating districts and among consumer uses by area. For example, the numbers in Table 2 for Utah's shipments to electrical utilities show that 43 percent of Utah's total non-metallurgical coal shipments were received by Utah generating plants compared to only 19.6 percent of Wyoming's shipments being similarly received in Wyoming. However, 95.3 percent of Wyoming steam coal shipments went to electric utilities compared to 73.3 percent of Utah's shipments. A high proportion of Utah's shipments was used by industrial consumers, 24.9 percent for Utah compared to 10.8 percent for the nation as a whole. The data of Table 3 display the percentages that

¹The states constituting the specified geographic division shown in Tables 1, 2, and 3 are as follows: West North Central—Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota; East North Central—Illinois, Indiana, Michigan, Ohio, and Wisconsin; West South Central—Arkansas, Louisiana, Oklahoma, and Texas; East South Central—Alabama, Kentucky, Mississippi, and Tennessee; all others—the remaining states less Alaska and Hawaii, plus the District of Columbia.

Table 1
DISTRIBUTION OF NON-METALLURGICAL COAL BY CONSUMER USE
SELECTED WESTERN DISTRICTS
January 1979 - September 1979
(thousands of tons)

To \ From		Utah	Wyoming	Arizona- New Mexico	Colorado	California	Oregon	Washington	Idaho	Montana	Nevada	West North Central	East North Central	West South Central	East South Central	All Other	TOTAL
Electric Utilities	20 (Utah)	3,150	-	-	-	-	-	13	-	-	699	190	1,125	-	195	-	5,370
	19 (Wyoming)	-	10,078	-	2,213	-	-	-	-	-	-	14,934	10,031	11,639	-	-	48,895
	18 (Ariz.-N. Mex.)	-	-	13,869	-	-	-	-	-	-	2,390	270	-	-	-	-	16,529
	16 & 17 (Colo.)	-	-	376	6,275	-	-	-	-	-	26	1,536	2,159	-	1	523	10,896
	All Other	-	-	-	-	-	-	3,817	-	2,470	-	36,737	104,851	19,592	52,584	101,594	321,645
Subtotal		3,150	10,078	14,245	8,488	-	-	3,830	-	2,470	3,115	53,667	118,166	31,232	53,302	101,594	403,337
All Other Industrial	20 (Utah)	570	59	103	3	573	13	289	53	24	63	7	69	-	-	-	1,825
	19 (Wyoming)	66	1,181	-	21	-	134	89	312	83	-	363	35	-	-	-	2,291
	18 (Ariz.-N. Mex.)	-	-	1,190	-	219	-	-	-	-	-	-	-	190	-	-	1,600
	16 & 17 (Colo.)	-	-	49	314	-	1	11	11	23	4	252	9	250	1	-	925
	All Other	-	-	1	-	3	3	25	-	-	-	3,882	17,026	2,568	5,458	13,299	42,265
Subtotal		636	1,239	1,343	338	795	151	414	375	130	67	4,504	17,139	3,016	5,458	13,299	48,906
Retail	20 (Utah)	99	1	-	-	-	1	23	9	-	-	-	-	-	-	-	133
	19 (Wyoming)	1	54	-	1	-	2	7	20	1	-	17	1	-	-	-	105
	18 (Ariz.-N. Mex.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16 & 17 (Colo.)	1	-	-	40	-	-	-	-	-	-	2	-	-	-	-	44
	All Other	-	-	-	-	-	-	-	-	-	-	182	390	4	237	260	1,071
Subtotal		101	55	-	41	-	4	30	29	1	-	201	391	4	237	260	1,353
TOTAL		3,887	11,372	15,588	8,867	795	155	4,274	404	2,601	3,182	58,372	135,696	34,252	58,997	115,153	451,596

Source: Compiled from Bituminous and Subbituminous Coal and Lignite Distribution, January - September 1979,
U.S. Department of Energy Data Report, DOE/EIA-0125 (79/30), January 25, 1980.

Table 2
PERCENTAGE DISTRIBUTION AMONG AREAS OF DISTRICT'S TOTAL
NON-METALLURGICAL COAL SHIPMENTS BY CONSUMER USE
SELECTED WESTERN DISTRICTS
January 1979 - September 1979

To		September 1973															
From	Utah	Wyoming	Arizona-New Mexico	Colorado	California	Oregon	Washington	Idaho	Montana	Nevada	West North Central	East North Central	West South Central	East South Central	All Other	TOTAL	
Electric Utilities	20 (Utah)	43.0	-	-	-	-	0.2	-	-	9.5	2.6	15.4	-	2.7	-	73.3	
	19 (Wyoming)	-	19.6	-	4.3	-	-	-	-	-	29.1	19.6	22.7	-	-	95.3	
	18 (Ariz.-N. Mex.)	-	-	76.5	-	-	-	-	-	13.2	1.5	-	-	-	-	91.2	
	16 & 17 (Colo.)	-	-	3.2	52.9	-	-	-	-	0.2	12.9	18.2	0.0+	4.4	-	91.8	
	All Other	-	-	-	-	-	1.0	-	0.7	-	10.1	28.7	5.4	14.4	27.8	88.1	
Subtotal	0.7	2.2	3.1	1.9	-	-	0.8	-	0.5	0.7	11.8	26.0	6.9	11.8	22.4	88.9	
All Other Industrial	20 (Utah)	7.8	0.8	1.4	0.0+	7.8	0.2	3.9	0.7	0.3	0.9	0.1	0.9	-	-	24.9	
	19 (Wyoming)	0.1	2.3	-	0.0+	-	0.3	0.2	0.6	0.2	-	0.7	0.1	-	-	4.5	
	18 (Ariz.-N. Mex.)	-	-	6.6	-	1.2	-	-	-	-	-	-	1.0	-	-	8.8	
	16 & 17 (Colo.)	-	-	0.4	2.6	-	0.0+	0.1	0.1	0.2	0.0+	2.1	2.1	0.0+	-	7.9	
	All Other	-	-	0.0+	-	0.0+	0.0+	0.0+	-	-	-	1.1	4.7	0.7	1.5	3.6	11.6
Subtotal	0.1	0.3	0.3	0.1	0.0+	0.1	0.1	0.0+	0.0+	0.0+	1.0	3.8	0.7	1.2	2.9	10.8	
Retail	20 (Utah)	1.4	0.0+	-	-	-	0.0+	0.3	0.1	-	-	-	-	-	-	1.8	
	19 (Wyoming)	0.0+	0.1	-	0.0+	-	0.0+	0.0+	0.0+	-	0.0+	0.0+	-	-	-	0.2	
	18 (Ariz.-N. Mex.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	16 & 17 (Colo.)	0.0+	-	-	0.3	-	-	-	-	-	0.0+	-	-	-	-	0.4	
	All Other	-	-	-	-	-	-	-	-	-	0.0+	0.1	0.0+	0.1	0.1	0.3	
Subtotal	0.0+	0.0+	-	0.0+	-	0.0+	0.0+	0.0+	0.0+	-	0.0+	0.1	0.0+	0.1	0.1	0.3	
TOTAL	0.9	2.5	3.4	2.0	0.2	0.0+	0.9	0.1	0.6	0.7	12.9	29.9	7.6	13.0	25.4	100.0	

Source: Compiled from data presented in Table 1.

Table 3
PERCENTAGE OF AREA'S RECEIPTS OF NON-METALLURGICAL COAL BY CONSUMER USE
PROVIDED BY SELECTED WESTERN DISTRICTS
January 1979 - September 1979

To From		Utah	Wyoming	Arizona- New Mexico	Colorado	California	Oregon	Washington	Idaho	Montana	Nevada	West North Central	East North Central	West South Central	East South Central	All Other	TOTAL
Electric Utilities	20 (Utah)	81.0	-	-	-	-	-	0.3	-	-	22.0	0.3	0.8	-	0.3	-	1.2
	19 (Wyoming)	-	88.6	-	25.0	-	-	-	-	-	-	25.6	7.4	34.0	-	-	10.8
	18 (Ariz.-N. Mex.)	-	-	89.0	-	-	-	-	-	-	75.1	0.5	-	-	-	-	3.6
	16 & 17 (Colo.)	-	-	2.4	70.8	-	-	-	-	-	0.8	2.6	1.6	0.0+	0.9	-	2.4
	All Other	-	-	-	-	-	-	89.3	-	95.0	-	62.9	77.3	57.2	89.1	88.2	70.9
Subtotal		81.0	88.6	91.4	95.7	-	-	89.6	-	95.0	97.9	91.9	87.1	91.2	90.3	88.2	88.9
All Other Industrial	20 (Utah)	14.7	0.5	0.7	0.0+	72.1	8.4	6.8	13.1	0.9	2.0	0.0+	0.0+	-	-	-	0.4
	19 (Wyoming)	1.7	10.4	-	0.2	-	86.5	2.1	77.2	3.2	-	0.6	0.0+	0.0+	-	-	0.5
	18 (Ariz.-N. Mex.)	-	-	7.6	-	27.5	-	-	-	-	-	-	-	0.6	-	-	0.4
	16 & 17 (Colo.)	-	-	0.3	3.5	-	0.6	0.3	2.7	0.9	0.1	0.4	0.0	0.7	0.0+	-	0.2
	All Other	-	-	0.0+	-	0.4	1.9	0.6	-	-	-	6.6	12.5	7.5	9.3	11.5	9.3
Subtotal		16.4	10.9	8.6	3.8	100.0	97.4	9.7	92.8	5.0	2.1	7.7	12.6	8.8	9.3	11.5	10.8
Retail	20 (Utah)	2.5	0.0+	-	-	-	0.6	0.5	2.2	-	-	-	-	-	-	-	0.0+
	19 (Wyoming)	0.0+	0.5	-	0.0+	-	1.3	0.2	5.0	0.0+	-	0.0+	0.0+	-	-	-	0.0+
	18 (Ariz.-N. Mex.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16 & 17 (Colo.)	0.0+	-	-	0.5	-	-	-	-	-	-	0.0+	-	-	-	-	0.0+
	All Other	-	-	-	-	-	-	-	-	-	-	0.3	0.3	0.0+	0.4	0.2	0.2
Subtotal		2.6	0.5	-	0.5	-	2.6	0.7	7.2	0.0+	-	0.3	0.3	0.0+	0.4	0.2	0.3
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data presented in Table 1.

each district supplied of the receiving area's total receipts of non-metallurgical coal. For example, the 1,125,000 tons of Utah coal received by utilities in the East North Central region amounted to 15.4 percent of Utah's steam coal shipments (Table 2). Yet in the East North Central region, this coal delivery was only 0.8 percent of total coal receipts (Table 3) and roughly 10 percent of Wyoming's shipments to that region.

It is important to observe that shipments for industrial consumption are often under a spot market or short-duration purchase contract. This is in contrast to the requirements of coal-fired utility boilers that are in large part filled under long term, life-of-plant contracts or, increasingly, by vertical integration of the utility into coal mining. The specificity of boiler design to fuel characteristics and the significance of total transportation and transmission costs in generating and distributing electricity using large central stations can lead to the limiting case of geographical concentration—the mine-mouth plant. But even without the mine-mouth plant, production for utilities is associated with large mines with a capability of filling unit trains for the for the life of the plant.²

Although Tables 1, 2, and 3 afford numerous comparisons of Utah magnitudes and proportions vis-a-vis the production originating in the surrounding states. The purpose of this compilation is to direct attention to three questions concerning the market potential for Utah coal. These questions are:

²The characteristics of utility fuel markets with special attention given to the Southwest coal region are discussed at length in Competition in the Coal Industry; Report of the U.S. Department of Justice, Pursuant to Section 8 of the Federal Coal Leasing Amendments Act of 1975, May 1978, U.S. Government Printing Office, Washington, D.C. 20402.

* Can Utah coal be expected to increase the small share it now holds of central and eastern utility markets?

* What are the coal consumption projections for Nevada and Utah generation stations and how secure is the continued participation by Utah coal in these markets?

* What is the potential for significant expansion in industrial consumption of Utah coal in California?

Another area of concern—the potential for exporting Utah coal to the Pacific Basin—must be addressed independently of information on current movements. This is also true of the remaining possibility for a large scale use of Utah coal for the production of either refinery feedstock or pipeline gas.

The time horizon relevant to the discussion of these issues is 1991, with particular attention also paid to 1986. This rather brief period of interest very helpfully limits the level of conjecture and avoids the arbitrary statement of assumptions that would be required in examining the post-1990 or post-2000 possibilities. The opportunities for pipeline gas production and for industrial coal burning in California are much more numerous in the decade of the nineties than within the next ten years. Whether within the next ten years, or farther off in the future, any shift in California away from oil and natural gas will open up a possible role for Utah coal is questionable. Still, this market will not be vouchsafed to Utah coal and the extent to which Utah coal finds increasing use in California depends upon the strength of competition from Wyoming and New Mexico suppliers.

The fact that Utah coal is largely underground coal is a major limitation to its competitive position. The costs per ton of coal

burned by the larger coal-fired generating plants in the states of the Four Corners region plus Wyoming are shown in Table 4. The plants in this region burning Utah coal are the three in Utah, the Gardner plant in Nevada, and a small part of the requirements of Arizona's Navajo plant. That higher Btu per pound rating for Utah coal does not offset its higher cost is shown by both the cost in cents per million Btu's and fuel production expenses stated in mills per kwh. Fuel expenses for these plants range from nearly 50 percent to as much as 85 percent of total production expenses. Hence, while the reliability of supply and the characteristics of the coal, are major considerations in the siting of generating plants, it is clear that Utah coal is not automatically favored for firing boilers in Nevada or California.

The elements shaping the market for Utah's coal can be grouped into eight items of consideration. Current judgments as to the direction and strength of each of these items are presented in the following section. Before discussing the individual items it can be observed that the net combined effort of all factors is now thought to foretell considerably less expansion in the market for Utah coal than was foreseen just a few year ago. Table 5 presents the assembled data for the Keystone Surveys of 1977 and 1979. The dramatic change in expectations is clearly presented in the downward shift in accumulated capacity for the expected expanding mines that is pictured in Chart 1.

The reported expectations for expansion do not include the capacity possessed by mines not reporting expected additions to capacity. This excludes up to three million tons per year of existing capacity and although part of this will by then be exhausted, the 1988 total capacity including the reported intentions will still exceed 35 million

Table 4

LARGER COAL-FIRED GENERATING PLANTS IN ARIZONA
COLORADO, NEVADA, NEW MEXICO, UTAH AND WYOMING
1977 COAL AND FUEL COSTS

	Capacity (Megawatts)	Net Generation (Million kwh)	Coal Burned (Thousands Short Tons)	Per Ton (Dollars)	BTUs/ Pound	Cost Per Million BTU (Cents)	Fuel Production Expense (Mills Per kwh)
Arizona							
Navajo	2,409.5	15,399.9	7,134.4	9.98	10,833	46.04	4.86
Four Corner 1,2,3	633.6	3,442.3	2,193.9	5.46	8,762	33.07	3.74
Four Corner 4,5	1,636.2	8,218.7	4,560.4	5.43	8,785	30.90	3.05
Colorado							
Arapaho	250.5	1,418.7	851.4	13.75	10,846	63.41	9.01
Cherokee	801.3	4,443.5	2,039.4	12.79	10,922	58.54	6.89
Comanche	778.5	4,882.7	2,895.1	10.74	8,508	63.09	6.54
Valmont	281.8	1,251.4	429.0	16.36	10,628	76.99	9.67
Hayden 1	190.0	1,146.6	582.2	6.13	10,811	28.00	3.36
Hayden 2,3	275.4	1,701.8	844.3	6.12	10,739	28.00	3.31
Nevada							
Gardner	340.9	2,181.9	1,026.6	25.77	12,017	107.22	12.18
Mohave	1,636.2	6,723.5	3,290.9	10.06	10,898	48.43	5.25
New Mexico							
San Juan	676.4	3,242.7	1,798.7	7.21	9,636	37.41	6.21
Utah							
Carbon 2	113.6	685.9	313.8	16.38	11,180	73.24	7.52
Gadsby 3	113.6	659.4	259.7	18.19	11,284	80.60	9.34
Huntington 2	446.4	1,490.1	631.7	15.04	12,048	62.40	6.47
Wyoming							
Jim Bridger	1,681.5	9,168.0	5,112.0	6.13	9,309	32.91	3.50
Dave Johnston	816.7	4,883.4	3,441.0	3.46	7,460	23.19	2.48
Naughton 1	163.2	1,137.9	625.9	9.40	9,589	49.04	5.21
Naughton 2	217.6	1,340.3	739.0	9.28	9,589	48.40	5.17
Naughton 3	326.4	2,030.1	1,124.7	9.22	9,601	48.01	5.18

^aData for Mohave are exclusive of the 20 percent operated for Los Angeles Department of Water and Power.

Source: Steam-Electric Plant Construction Cost and Annual Production Expenses, 1977, U.S. Department of Energy, (December 1978), DOE/EIA-0033/3(77).

Table 5

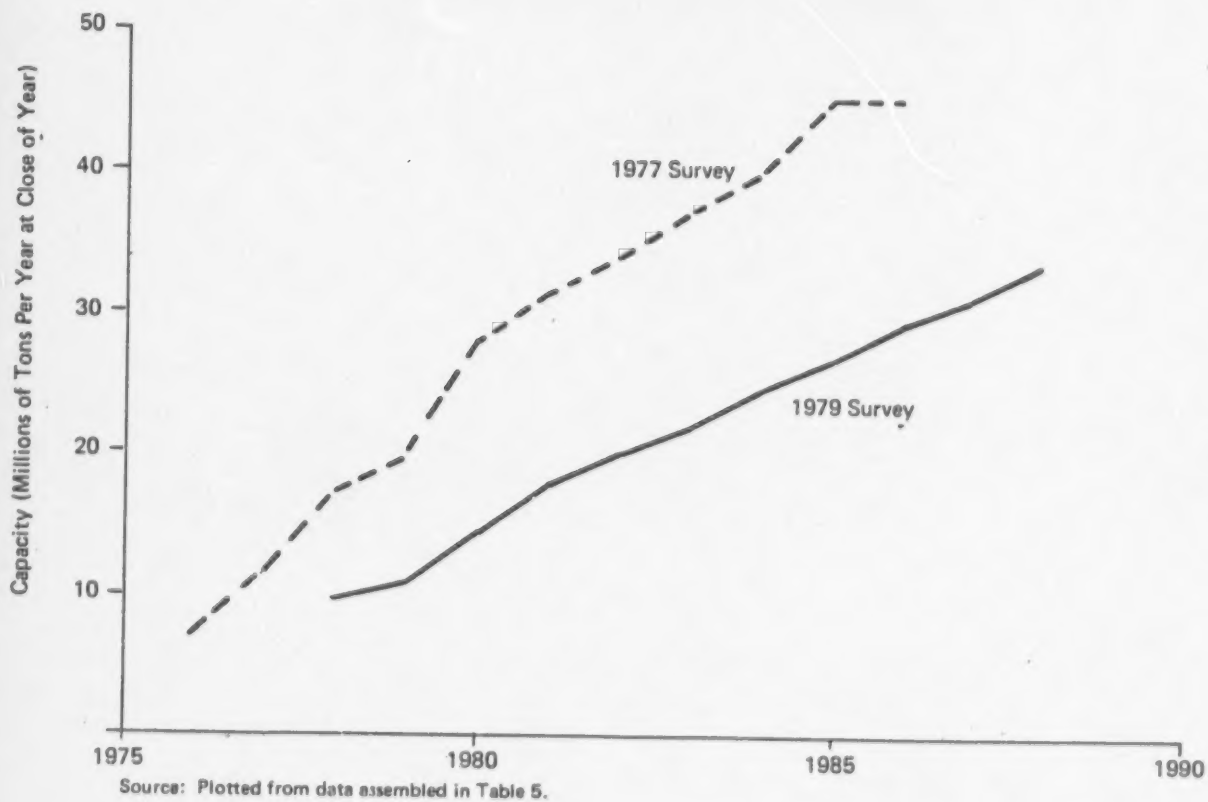
Capacity by Year of Coal Mines in Development,
Expansion, or Planning Stages in Carbon,
Emery, Sevier, or Wayne Counties, Utah for
1977 and 1979 Keystone Surveys

<u>Year</u>	<u>Capacity</u>	
	(in Million Tons per Year at close of Year)	
	<u>1977</u> <u>Survey</u>	<u>1979</u> <u>Survey</u>
1976	6.70	
1977	11.20	
1978	17.10	9.90
1979	19.65	10.53
1980	27.80	13.91
1981	31.28	17.75
1982	34.19	20.00
1983	37.02	21.77
1984	40.32	24.43
1985	45.15	26.49
1986	45.15	29.40
1987		30.93
1988		33.43

Source: 1977 Survey: Coal Age, Vol. 83, No. 2, Feb. 1978
1979 Survey: Coal Age, Vol. 85, No. 2, Feb. 1980

Chart 1

Capacity by Year of Coal Mines in Development, Expansion, or Planning Stages
in Carbon, Emery, Sevier, or Wayne Counties, Utah
for the 1977 and 1979 Keystone Surveys



tons per year. This, it will be judged, is substantially above the plausible sales volume and thus the limiting factor on future Utah coal production will be its marketability.

Elements Determining the Demand for Utah Coal

The elements structuring the marketability of Utah coal can be grouped into the following eight areas:

1. Projected Coal-fired Electricity Generation
2. Projected Industrial Boiler Conversion
3. Pacific Rim Export Market for Steam Coal
4. Demand for Utah Metallurgical Coal
5. Elasticity of Supply of Utah Coal
6. Elasticity of Supply of Substitute Wyoming and New Mexico Coal
7. Transportation Costs
8. Non-Traditional Demand (Pipeline Gas)

Coal-fired Electricity Generation

The past decade produced major revisions of expectations in both the geographical market area for Utah utility coal and the level of production that could be sold. In 1971 the New Source Performance Standards of the Environmental Protection Agency created the concept of compliance coal. The implication was that western coal, whose untreated gases complied with the requirement of no more than 1.2 lbs. of sulfur dioxide per million Btu could substitute, even at a substantially higher delivered price, for non-compliance coals. The 1979 promulgation of different New Source Performance Standards was a response to the Clean Air Act of 1977 requiring the use of the best available control technology. As all plants beginning operations between 1985 and 1993 are required to use scrubbers, higher cost but low sulfur Utah coal will not be competitive in delivery to forthcoming eastern plants. And under any conditions, Utah coal cannot be expected to expand its distribution in areas where Wyoming, Colorado, or New Mexico coal has a locational advantage.

The cost per million Btu column of Table 4 shows the wide differences in this region's experience. The Utah coal supplying the three Utah plants and the Gardner plant in Nevada is substantially higher in Btu content than coal firing the others. But, this does not offset the higher mining and distribution costs of Utah coal since cost per million Btu is also very high for the plants using Utah coal. Huntington No. 2 is a conveyor supplied plant using underground Utah coal. Utah Power and Light also operates the Naughton Plants in Wyoming using lower Btu, stripmined coal. The Wyoming coal has 80 percent of the heat value of the Utah coal but the Naughton plant's costs per million Btu are less than 80 percent of Huntington's 62.4 cents per million.

Water availability, air quality limitations, cost of capital, and distribution and transmission costs as well as fuel costs influence the efficiency of the selected plant's scale and site. With these complexities, the design problems of making efficient location selections under the uncertainties of local and peak load forecasting are monumental. Then process of obtaining regulatory approval adds significant chances for delay if not denial. The consequence is that large-scale sales possibilities for Utah coal to be burned out-of-state in the next five to ten years are limited to a few projects. And of these, no one is absolutely secure and several are quite doubtful.³

³The uncertainty over which specific plants might be brought into existence is not to be extended to a supposition that there is disagreement as to whether or not an expansion in capacity is expected. There are differing judgments over the timing and magnitude of expansion but there is broad agreement as to the fact of expanding loads over the next five and ten years. Appendix 1 presents a compilation of regional load projections developed by Dr. Rodger Weaver of the Bureau of Economic and Business Research, University of Utah. This compilation is reproduced from "Electricity Demand Forecasting: A Survey of Methodologies and Projections" by Rodger Weaver and David Moewes, (A Report in the continuing research program of the Utah Consortium for Energy Research and Education) University of Utah, Salt Lake City, Utah, February 1980.

The electrical generation expected within the broad area of Utah, Nevada, and California is bracketed by the high and low values of Table 6. Even the low projection is for an increase of 83,407 gwh by 1990 over 1980. If the increases were produced entirely by coal-fired plants with heat rates of 10,000 Btu per kwh using 12,000 Btu per pound of coal the increased coal required would amount to an additional 34,753,000 tons per year. Similarly, the high projection, if produced entirely by coal would require an increase in coal burning by 46,590,000 tons in 1990 over 1980. The range of expansion in coal burning implied by only the Utah portion of Table 6 ranges from 2.9 to 4.4 million tons per year. This range of market expansion for Utah coal for Utah electricity presents acceptable planning figures. But the much larger expansion in California-Nevada electricity is only partly expected to come from coal. And even then the question will remain as to the extent of Utah's participation in the out-of-state market.

The data assembled in Table 7 are the sum of the California and Nevada reported estimates to the Western Systems Coordinating Council. Significantly, these estimates of fossil fuel generation for the year 1979 through 1988 show a strong surge in coal generation in 1987 and 1988 as several planned large plants are brought on line.

The plants that could be brought on line are listed in Table 8. They range from the plants currently under construction (Hunter 2 and Valmy 1) to projects that are in the very early stages of development. It is quite possible that several of the even firmly committed projects will realize some slippage into the beginning of the next decade. And, it is clear that the utilities are not simultaneously planning on the total projected increments coming on line at these dates. The projected plants

Table 6

High and Low Electrical Energy Production
California-Nevada and Utah
1980, 1985, and 1990
(gwh)

	California plus Nevada		Utah		Total	
	Low	High	Low	High	Low	High
1980	181,902	187,734	12,775	13,333	194,677	201,067
1985	219,243	234,212	15,920	17,843	235,163	252,055
1990	258,245 ^a	289,006	19,839	23,878	278,084 ^a	312,884
Change, 1980 to 1990	+76,343	+101,272	+7,064	+10,545	+83,407	+111,817

^aMagnitude interpolated from 1985 and 1995 amounts projected by the California Energy Conservation and Development Commission.

Source: Selected from data presented in Ten-Year Coordinated Plan Summary, 1979-1988, Western Systems Coordinating Council (Salt Lake City, Utah) May 1979.

Table 8
Significant Coal-Fired, Generation Additions
Utah, Nevada, and California
1980-1988

Plant	Location	Size (in MW)	Commercial Operation Date
Hunter 2	Utah	400	June 1980
Valmy 1	Nevada	250	October 1981
Hunter 3	Utah	400	June 1983
Warner Valley 1	Utah	250	June 1983
Reid Gardner 4	Nevada	250	June 1983
Warner Valley	Utah	256	June 1984
Valmy 2	Nevada	250	October 1984
Hunter	Utah	400	June 1985
Allen 1	Nevada	500	June 1985
Allen 2	Nevada	500	June 1986
Intermountain 1	Utah	750	July 1986
Fossil 1	California	800	July 1986
Unknown 1 (Sierra Pacific Power)	Undetermined	125	May 1987
California Coal	California	250	June 1987
Allen 3	Nevada	500	June 1987
Intermountain 2	Utah	750	July 1987
Fossil 2	California	800	July 1987
Wellington 1	Utah	500	June 1988
California Coal 2	California	250	June 1988
Allen 4	Nevada	500	June 1988
Fossil 3	California	800	June 1988
Intermountain 3	Utah	750	July 1988

Source: Ten Year Coordinated Plan Summary, 1979-1988, Western Systems
Coordinating Council (Salt Lake City, Utah) May 1979.

The importance of these numbers is twofold. First, the projected increase in utility coal burning in Utah, Nevada and California amounts to approximately 12 to 16 million tons per year by the end of the decade. This, plus the existing shipments to utilities, places Utah's production for electricity generation at a high expectation (assuming no Wyoming or New Mexico penetration into these markets) of roughly 20 million tons per year.

Second, the Warner Valley and Allen plants are located and projected on the basis of life-of-plant coal supply from the strippable Alton field of Southwestern Utah. The Warner Valley plant in particular is feasible only with a slurry pipe line from the Alton field or, as a second order event following an investment in railroad development into the Kaiparowits.⁴

The Allen plants can be considered feasible with slurry delivery of Alton coal but by themselves would fall perhaps 20 million tons short of the coal haulage that would justify a Kaiparowits railroad investment. As there is no projectable market for that magnitude of Kaiparowits production given the elasticity of supply of central Utah or Wyoming coal, the Warner Valley project is seen to be crucially dependent on the the development of the Alton field. In turn, the Allen plants alone are likely to be sufficient to economically justify the Alton field development but it is clear from the information in Tables 7 and 8 that the Warner Valley and Allen plants are not strictly necessary to the regional generation requirements of the next decade.

⁴At five hundred megawatts capacity, the Warner Valley plant uses roughly 1½ million tons per year, which can justify an efficient, large scale, underground coal mine but cannot itself justify the railroad investment to move that amount of coal.

for Utah domestic consumption (the three Hunter installations and either Wellington 1 or the 25 percent of a completed, four unit Intermountain plant) total 1,700 to 1,950 MW of additional generating capacity. This is just sufficient at a 70 percent plant factor to cover the increase in electrical energy production of the high projection with no improvement in plant factor of the existing system. (Important questions such as peak load capacity requirements are ignored by this approach but for our purposes the coal requirements are adequately related simply to electrical energy production.)

The projected plants associated with regional requirements of Southern California-Nevada total 5,500 MW of capacity by 1988 while those for the Northern California-Nevada area sum to 3,025 MW.

The total coal fired capacity increment of 8,525 MW, at a 70 percent, plant factor, would generate an additional 52,275 gwh of energy production in these two states in 1988. This is far in excess of the projected increase in the coal generated production of 23,173 gwh implied (43,796-20,623) by the data of Table 7. The capacity-permitted increase of 52,275 gwh (at 400 tons of coal per gwh) would require approximately 21 million tons of coal per year above present rates. However, the planned coal-fired generation increase is only for roughly 9.3 million tons per year more by 1988 than was burned in 1979. The difference between the possible (all listed plants) and the estimated coal burning generation in 1988 is 29,102 gwh. That difference is almost 50 percent greater than the combined production of the sum of the projected Warner Valley and Allen Plants plus Fossil 3. These seven projected generators total 3,300 MW of capacity while 29,102 gwh at a 70 percent plant factor would require a capacity of 4,746 MW.

To put it more directly, the regional electricity requirements of the next decade do not necessitate the stripping of the Alton field. Nor is the Alton field without substitutes as a coal source to the Allen plants. However, the Alton field may well be the lowest cost supply to the Allen plants if cost is limited to those expenses directly borne in the extraction and delivery of the coal and does not extend to the environmental interaction with an alternative resource use.

The possibility is strong that the Alton field will not be developed within the coming decade because of the litigation that is likely to stem from its proximity to Bryce Canyon National Park. This would remove the Warner Valley plants from the list of prospective generation additions and would require the Allen project to develop alternative coal sources. The central Utah mines would be competing with Southwest Wyoming for this role but the possibility exists that the generating stations could be subject to relocation, which conceivably could extend the areas of possible supply to New Mexico mines. For example, the Mohave area—containing possible sites of California Coal 1 and 2—can be efficiently served out of New Mexico while sites in Central and Northern Nevada improve the competitiveness of Wyoming coal.

To summarize this section, the market possibilities for Utah coal in supplying electrical utilities have an upper bound of 20 million tons per year by the end of the decade. Utah mines may realize only a part of this potential, depending on the structure of transportation costs and the elasticities of supply of Wyoming and New Mexico coals. There is a remote chance that the Alton field development will escape protracted litigation in which case up to 6 million tons per year of production could be diverted from Central Utah (or from Wyoming and New Mexico mines) to Southwestern Utah.

Industrial Boiler Conversion

Industrial coal burning in California presents New Mexico, Utah, and Wyoming fields with prospects for very large expansion in shipments but little realization of this potential is expected with the next ten years. The economic costs of converting boilers from natural gas or oil to coal, and the costs of emission control on coal burning limit significant coal use within the decade to two major forms: the first is the large scale, new boiler typical of—and largely limited to—new electrical generation plants; the second potential for industrial use is coal conversion to gas or liquid fuels that avoid high boiler conversion costs and conform to air quality requirements.

These and related questions have been recently investigated by the Radian Corporation for the California Energy Commission. The draft of this Summary Report observes limited potential for coal conversion prior to 1990 with the best potential being pressurized coal gasification located at large electricity generation stations.⁵ Limited and technologically risky prospects, in the face of regionally adequate oil and natural gas supplies prior to 1990, are dramatically reversed by the end of the century. Projections of industrial coal use in California ranging upward to 100 million tons per year are observed by the Radian report and it seems plausible that further investigation would give credence to this magnitude. The implications are of the utmost importance for the Utah fields. There are very limited possibilities for expansion within the next ten years but the expectations can be very confidentially held for future high levels of output from Wyoming, Utah, Arizona and New Mexico fields. The fact is that

⁵California Coal Study Summary Report Draft prepared for California Energy Commission, Sacramento California, by the Radian Corporation, Austin, Texas, August 1979.

leases in such areas as the Kaiparowits have little to no market production opportunity within the 1991 time horizon but are valuable properties in terms of the cash flow potentials from production that would be highly marketable 15 to 25 years from now. In the next 10 years an optimistic expectation would be for Utah's total export of industrial (non-coking) coal to at best more than double to 5 million tons per year.

Pacific Basin Export Market (Steam Coal)

Considerable publicity has attended the recent Japanese statements of coal import intentions.⁶ Declarations that Japanese import levels will move to 54 million tons per year in 1990 from the present 1 million are matched by compilations of possible Korean and Taiwanese increases. (Boeing Pacific submitted to the Utah State Legislature import projections that exceed 102 million tons per year for Japan, Korea and Taiwan.)

There is little reason to question the existence of this Pacific Basin market or even to doubt seriously the level of importation. There are, however, obviously limits to the share of this market that would be filled by U.S. exports and, even more so, severe reservations as to the possible role of Utah coal. Business Week of January 28, 1980 presented the competitive advantage of Australian coal in terms that amount to a delivered price advantage conservatively of 20 to 25 percent.

The implication for the bargaining process is that of the Japanese and the Australians negotiating over these substantial location rents with the Japanese perhaps placing limited commitments elsewhere as an investment in limiting the strength of the Australian position. Substantial commitments for Canadian coal are being expanded (Coal Age April 1980, pp. 53 and 57) and China, the Soviet Union, and Columbia are other potential

⁶Coal Age, November 1979 p. 25; Business Week, January 28, 1980 p. 35.

rivals to United States coals for these markets. The United States can expect a small portion of the market just on the basis of the Japanese interest in preserving options and limiting risk, but one cannot impute a market share to Utah on the basis of economic advantage. In addition, the Boeing-Pacific presentation on their pipeline project stated a direct investment requirement of \$67 per ton year of capacity. A real rate of return of 15 percent per year places a cost of capital charge of \$10 per ton for each ton moved at full capacity. When the maintenance expenses and variable costs are brought in, it becomes very difficult to posit an advantage for underground Utah coal shipped either by pipeline or by rail over strippable Wyoming coal.

A very optimistic projection for export of Utah steam coal by 1990 would be 3 million tons per year.

Demand for Utah Metallurgical Coal

Met coal confronts less process substitutability than steam coal. However, the demand for met coal with respect to its own price appears to be considerably less elastic than that for steam coal. However, met coal production may show more sensitivity to the stage of the business cycle and is closely related to the specific circumstances of the iron and steel industry. The marketability of Utah metallurgical coal is a remote consideration in this investigation as the examined leases do not contain marketable met coal. Nor will the existing or potential met coal production be channeled into steam coal markets.

The Utah met coal can be expected to continue being used at Fontana, California, and Orem, Utah. At both of these installations the production of satisfactory coke requires the blending of the Utah coal with New Mexico or Colorado coal. The low quality of the Utah coal and the distance to

ocean ports foreclose any potential for export on the world coke market. This contention has the somewhat remote implication of foreclosing any rapid and large magnitude expansion of met coal production that could bid supplies, transportation, and labor services away from a possibly expanding steam coal production. Steam coal production in the Carbon-Emery Sevier region in the next decade will be limited by its marketability in competition with other coals and not by a limited claim on reserves nor by a persistent shortage of factor services faced in competition with an expanding met coal production.

Elasticity of Supply—Existing Establishments

The data presented in the introduction sections on output plans as surveyed in 1977 and 1979 express the recent retrenchment in expectations. For some mines the current situation is even one of unintended increases in producer stocks. The distribution report cited earlier presents for the first nine months of 1979 the information that 564,000 tons of the 8,626,000 tons of production in District 20 went into increased producer stocks. The possibility exists that one large producer has entered into short term delivery contracts at prices below those sufficient to cover full cost. This is rational as production is better than reduced output as long as price covers variable costs. It is also a wise policy if future marketing expectations or contracts justify an investment in maintaining an ability to produce. But the fact is that current producing capability exceeds the market demand at prices covering full costs of some mines.

The information assembled by Jackson Moffett for the Office of Technical Assessment (OTA), (memorandum of December 21, 1979) when

accumulated for steam coal mines and limited to Carbon, Emery and Sevier Counties identified production aspirations involving federal coal leases, for existing mines now in production, of 14.4 million tons per year in 1985 and 17.3 in 1990. Corresponding ambitions for mines with pending mine plans awaiting approval totaled 5.7 and 12 million tons per year in 1985 and 1990 respectively. Potential Utah mines, those with no mine plans submitted but that could be in production in 1986, similarly total 1.3 and 6.5 million tons per year for those years. These accumulations of output intentions for all three classifications total 21.4 and 35.8 million tons per year in 1985 and 1990 respectively. Although these numbers are substantially less than even those of the 1979 Keystone Survey reported in Table 5, they still are well above the plausible amounts that could be marketed.

The existing reserves of coal in the Wasatch Plateau and Book Cliffs fields are not relevant limitations to the elasticity of supply in the near and intermediate futures of interest. However, a period of ten years extends into the area of the "long-run" where industry capacity is highly variable. This is highly important in the coal industry where, as discussed in the introduction, both entry and exit of producers is at relatively low cost. This raises the possibility that the expected expansion in production by something like 250 percent in ten years might confront limited supplies of factor services with consequent increases in factor prices and cost of production.

Industry costs can be expected to increase as increasing output requires using the less advantaged reserves, but expressions of willingness to produce imply a highly elastic response. The supply price of equipment may or may not increase but in either event this is a national market and the relative expansion or failure to expand in Utah will not appreciably

affect the price of equipment. Labor services, especially of first-line supervisors, will be a near-term limitation but the period of ten years is sufficient for considerable population relocation and skill acquisition to take place.

The substantial relocation of population into this sparsely populated region is a principal requirement for industrial expansion. This becomes a possible source of limitation on expansion simply because the Carbon-Emery area does not possess a labor market of depth within which changing prices induce a shifting of industry of employment. The expansion in the coal industry as a whole will induce workers to take up mining occupations because of the increasing wage rates. However, these workers in large proportion will be residents of other communities. Fortunately, the question of expansion capability of this region has been examined at length and the estimated inputs reported in the draft Environmental Statement are consistent with a very elastic long-run industry supply curve for regional coal production.⁷

The high level of output analyzed in the regional impact statement was for 42 million tons per year in 1990; an output rate 40 percent higher than the output now thought plausibly marketable. Even that high rate of output does not reach regional limits in the environmental carrying capacity or in the transportation system although appreciable investments would be required in highway improvements. In particular, it was found that 42 million tons per year could be moved by the existing rail system with only minor improvements being necessary. Clearly, the 30 million tons per year, with maybe 6 million being burned locally at Utah Power and Light plants is a tolerable burden by the E.I.S. standards.

⁷Draft Environmental Statement, Regional Analysis, Part 1, Development of Coal Resources in Central Utah; Department of the Interior, 1978.

A large in-migration and resulting population expansion, slightly more than doubling between 1980 and 1990, is presented in the E.I.S. as being the consequence of expansion to 42 million tons per year output. Even so the community expansion would disturb about 3,170 acres with the important finding that "...changes in the hydrologic system of the region would be so small as to be difficult to detect."⁸

The implications for air quality of concentrated coal burning are the potentially most serious consequences of expansion in the region. But these are the consequences of electricity generation, not of coal mining and the expansion in coal mining can occur independently of the local burning of coal.

Elasticity of Supply of Substitute Wyoming and New Mexico Coal

There is one serious disadvantage faced by Utah coal—most of it cannot be surface mined. This would not necessarily be a limitation to the marketing of Utah coal except that there is a large amount of often inferior, but also much less costly, surface coal in Wyoming, Arizona, and New Mexico. The competitiveness of these substitutes for Utah coal in the Southwest is partly a function of the costs of transportation. The effect of transportation costs on the substitutability of non-Utah coals will be considered in the next section. The purpose of this section is simply that of briefly presenting the fact of an abundance of good alternatives to coal from Utah.

Of course, the simple abundance of coal is not a sufficient condition for its development in the near future. The important features are its quality and the expense of mining and transporting the coal to the place of consumption.

⁸Environmental Impact Statement, Ibid., Part IV., 17.

Arizona, New Mexico, and Wyoming all possess adequate, uncommitted reserves. While nearly all are typically low in sulfur, there are wide variations in attributes such as moisture, ash, and Btu per pound. Still, the most significant difference is in accessibility to markets. The Arizona reserves and some of the New Mexico coals are on Indian Reservations. This offers possible complications in negotiating lease terms and conditions but the significant disadvantage of these fields is their relative distance from railroads. They, like the Kaiparowits, depend for their development on volumes and conditions that justify a large investment in transportation systems. The Central Utah coals and the fields in Southern and Western Wyoming have a strong current advantage in being well served by railroads with only relatively minor investments in roadbed extension and loading facilities being required for further development of Utah and Wyoming mines.

Major transportation investments are warranted when, as at Black Mesa in Arizona, a life-of-plant contract for a large generating station leads to an expectation of an adequate return. Certainly the possibilities exist in the 1990's for large coal shipments from the Arizona and New Mexico fields into California for industrial boilers (via gasification) and they, with transportation in place, will then be highly competitive with Utah coal.

The strippability of Arizona, New Mexico and Wyoming coals is their source of advantage, not their quality. Table 4 implies that the Btu per pound of Black Mesa coal (at the Navajo and Mohave plants) to be approximately 10,850. This is less than 90 percent of the heat production of Utah coal, but the cost per million Btu was observed earlier to be much less than that of delivered Utah underground coal. The committed production of

the Black Mesa mines largely accounts for the proved reserves under Peabody lease but the 1979 Keystone Coal Industry Manual reports suggestions that strippable Black Mesa resources within 130 feet of the surface may amount to 1 billion tons.

Much larger estimates are reported in the Keystone Manual for New Mexico and Wyoming. Strippable resources (less than 250 feet of overburden) are reported at 5.9 billion short tons for the San Juan Basin.⁹ The remaining strippable reserves of the Green River, Hams Fork, and Hanna regions of Wyoming are presented at 3.27 billion tons.¹⁰

The competitive position of Utah vis-a-vis Arizona for Nevada and Southern California communities is fortuitously strong because the Arizona fields are not connected to interstate markets by rail. But a large consumer, as has already occurred with the Nanajo and Mohave plants, could justify another major investment in Arizona or New Mexico.

In the rivalry with Wyoming coal, Utah has a small advantage in relative distance but this advantage and the advantage of higher quality coal may both be offset by the lower cost of surface mining. The interesting developments in this regard will be the solicitation and negotiation positions for alternative coal sources for the Allen plants.¹¹ The uncertainty over the timeliness of coal delivery from the Alton field (if not over its ultimate availability) has led to explorations of

⁹1979 Keystone Coal Industry Manual, p. 532.

¹⁰Ibid, p. 622.

¹¹An informative description of the contracting process for life-of-plant coal delivery is presented in Competition in the Coal Industry, Report of the U.S. Department of Justice Pursuant to Section 8 of the Federal Coal Leasing Amendments Act of 1975, May 1978, pp. A 39-A 46.

the costs of alternative coal sources. Certainly the type of operation at Kemmerer, Wyoming, described in Coal Age constitutes a powerful rival to underground Utah mines.¹² Whether or not Utah coal can contest this market with Wyoming will depend in large part on the structure of transportation costs.

Transportation Costs

Because coal is a widely occurring, low specific value commodity, transportation costs are a major influence in organizing and modifying the pattern of mining.¹³ Not only does the cost of delivery to point of consumption often exceed the cost of mining the coal, but the effect of transportation charges on the relative profitability of different mines depends on the quality of coal mined.

A slightly oversimplified example illustrates the complexity of these effects. As shown in Table 4, Utah Power and Light reported for 1977 costs of \$9.28 (the weighted average of Naughton 1, 2, and 3) and \$15.04 per ton of coal for Kemmerer and Huntington Canyon Coals respectively. These prices translate to costs of \$0.484 and \$0.624 per million Btu as the Wyoming coal averaged 19.188 million Btu per ton against Utah coal's 24.096. Letting these prices represent the prices of heat energy FOB mine, the effect of transportation costs on the comparative costs of the two sources of heat energy depends both on distance and heat content.

By way of example, let 8 mills per ton mile be the rate for moving large sustained amounts of coal to point of consumption in unit trains.

¹²"Kemmerer Surface Mines 12 Seams," Coal Age, Volume 84, Number 9, September 1979, pp. 116-129.

¹³A brief but comprehensive discussion of the influence of transportation costs and of statistical efforts to estimate cost relationships is found in Richard L. Gordon, et. al., Historical Trends in Coal Utilization and Supply: Report to the U.S. Bureau of Mines (Bureau of Mines Open File Report 121-76) August, 1976, pp. 6-38 to 6-79.

Then, as the Utah coal yields nearly 26 percent more heat energy per ton, the Wyoming coal is charged .000417 dollars per million Btu per mile contrasted to .000332 dollars per million Btu per mile for the Utah coal. If both coals must move equal distances to the point of consumption, there then is a distance here, (1,653 miles) at which the Utah Btu's become the lower cost heat. The higher the transportation rate or the larger the quality difference between the coals, the shorter the distance at which the coals become competitive. (At one cent per ton mile, the distance to equal cost per Btu becomes 1,322 miles. If a fixed handling fee per ton is incorporated into the charge, the distance to equality becomes even less.)

More realistically, differences in properties of coals other than Btu will also affect their relative attractiveness. Furthermore, the transportation charges will differ by other than a linear function of the differences in distance. Still the general conclusion follows that higher cost but higher quality can compete effectively with Wyoming coal both when the distance to the Utah mine is substantially less than the distance to the Wyoming mine, and then again, when the distance to market for both is great. On the other hand, the advantage Utah coal has with the high freight charges of carload shipments will be diminished when large volume coal movements lead to the use of lower cost unit trains. This means that Wyoming coal will become increasingly competitive with Utah coal because the possibilities for large expansions in coal consumption are in fact those where the volume can lead to unit-train economies.

The rate assumed above of 8 miles per ton mile is a reasonable approximation to recent practice. It is to be expected that the railroads will attempt to capture what portion they can of the rent accruing to

favorably located or inexpensively mined coal.¹⁴ Studies of unit-train transportation costs were carefully examined and reported on by Professor Richard Gordon.¹⁵ The estimates varied widely in their implication for fixed cost and variable costs in consequences both of accounting conventions and econometric formulation used. Still costs were usually not far from the 6.5 mills per ton mile level. An inflationary increase of 15 percent per year would be an appropriate assumption except for the singular recent acceleration in fuel prices.

A recent model of unit train costs produced an estimate of 6.5 mills per revenue ton-mile.¹⁶ This was calculated for fuel costs at 34 cents per gallon and a consumption of 7,735 gallons on a delivery of 9,991 net tons in a 750-mile, one-way (1,500 round trip) case. The total cost including maintenance allowance and apportioned contribution to fixed costs was calculated as \$48,861 of which \$2,630 would be fuel costs. A possible increase of fuel charges to \$7,735 (almost 300 percent) would increase adjusted total costs in that model by less than 11 percent to \$53,966. This higher total cost, distributed over the 7,493,250 revenue ton miles, then yields an adjusted ton-mile cost of 7.2 mills. The greater the proportion of total costs accounted for by fuel costs, the higher the sensitivity of total cost to relative increases in the price of fuel. The crucial point for Utah mines is, however, that the greater the cost of transportation, the less is the importance of the difference in mining cost between Utah underground and Wyoming surface coal, and the greater

¹⁴The success of the railroads in this effort was recently examined by Martin Zimmerman; "Rent and Regulation in Unit-Train Rate Determination," The Bell Journal of Economics, Vol. 10, No. 1, Spring 1979, pp. 271-281.

¹⁵Richard L. Gordon, et. al., Historical Trends in Coal Utilization and Supply, Op. cit.

¹⁶Electrical World, October 15, 1979, p. 57.

the importance of the higher heat content of Utah coal in offsetting the production cost disadvantage. Still, the condition for the 1980s is that Wyoming coal is very much a competitor to Utah for fueling the power plants tentatively scheduled for Nevada and Northern California, and the 1990 burning projection developed earlier for Utah coal must be regarded as a plausible upper limit to be realized only if western delivery of Wyoming coal does not displace Utah coal.

There is some discussion of using a slurry pipeline to move coal from the Central Utah fields to California ports. But this conception has no apparent merit as a substitute for existing railroad service. The reported Boeing Pacific investment requirement of \$670 million would require capital charges alone that would exceed the likely total cost of unit-train shipment. Slurry easily has economic merit in such applications as the Alton field to Allen plant project where there is no existing rail alternative. The Alton field development projects depend on other than immediate economic considerations and good estimates of slurry costs are not relevant for this discussion.

Non-Traditional Demand (Pipeline Gas)

Marketing opportunities for Utah coal in innovative applications such as high Btu pipeline gas, liquefaction for refinery feedstock production, etc., are often discussed but are only very remote possibilities for appreciable volumes of Utah coal in the next ten years.

The ultimate application of coal to these ends is exceedingly likely, but the economic justification for volume production does not exist within the time horizon of the next ten years. Neither the regional availability of oil nor natural gas can be expected to constitute a regional need for a substitution with coal derived fuel within the next ten years. Still,

technology acquisition will proceed and perhaps limited commercial plant development within this region may be brought about in the decade. Even then, it should not be expected to be utilizing large volumes of coal. The possibilities exist for limited use of Utah coal but the nation's realization of large scale coal conversion complexes should be expected to be concentrated in areas of abundant, low cost coal, or where high sulfur coal can be used because of the opportunity for creating a clean fuel. Neither of these grounds justify the use in volume within this decade of Utah's high quality coal.

The Implications of Market Factors
for the Development Potential of
Specific Federal Coal Leases in Utah

The plausible upper limit of marketable Utah steam coal as of 1990 or 1991 was presented in the previous section as being 28.5 million tons per year (retail prospects--space heating, lump coal, etc.-- adding generously, one-half million to the major elements of demand). This differs in its essentials from the Salt Lake City task force assumption only by being one million tons per year less in the electrical generation component of demand. This is not a projection difference of any consequence and 30 million tons per year is an acceptable rounded magnitude.

The salient aspect of this market projection is that it is less than 90 percent of the expected capacity for 1988 as reported in the 1979 Keystone survey (see Table 5) and less than two-thirds of 1977's expectation for 1986. Although 30 million tons per year by 1990 is a high rate of expansion in output over present levels of roughly 12 million tons per year, it happens to be much less than the total willingness to produce of all existing and potential operators. Furthermore, the market for Utah coal in the 20 years following 1991 can easily be expected to again more than triple. In the interim, there is the likelihood of some lease holders investing in development and contesting for markets in the interest of protecting a claim on what, by 1995, could become a property yielding a substantial net cash flow.

The best change for new entrant mines are held by reserves that are cost competitive in delivery under long-term commitments to large

power generating stations. This implies several necessary conditions, the lack of which relegates several properties into a category of "unfavorable for development." However, the holding, by a reliable operator with easy access to capital for mine development, of adequate reserves for the long-term, large-scale production of a high quality coal under favorable mining and transportation conditions is not itself sufficient to guarantee entry within the 1990 horizon. The elasticity of supply from existing operation and the limited marketability assumption creates a situation where disadvantaged leases can be classified as unfavorable for development by 1991. But, at the same time, many good to superior holdings can at best be claimed to have uncertain prospects. Some, but far from all, will enter into production by 1991, but the favorable development prospects are limited entirely to existing, established producers for whom the developable lease is an extension of a successful operation. Market expectations are the crucial determinant of this highly limited potential for entry. If Utah was expected to market 50 million tons per year by 1991 rather than 30, the general finding would be "favorable" prospects for all except the disadvantaged holdings.

The following, annotated ratings of market expectation for the lease blocks are presented in order of "Packet Number."

Packet 1

Lessee: Carbon-Emery Bank

1986: Unfavorable

1991: Unfavorable

Market expectations are not a factor in assessment as the poor character of the resource rules out efficient production.

Packet 2

Lessee: Eureka Energy

1986: Unfavorable

1991: Unfavorable

Market expectations contribute uncertainty to the assessment of the development prospects because the property could be integrated into Eureka Energy's production from adjacent tracts. In the absence of this possibility of captive production for P.G. & E.'s Montezuma Plants (previously Fossil I and II) the market expectations are negative. The presence of this possibility of being folded into a captive operation is not sufficient to raise the development prospects to favorable because, as a secondary point, it is not necessary for Eureka Energy to fold this parcel into its mining program. More importantly, P.G. & E. has recently announced a two-year postponement of construction (and of on-line dates from 1986 to 1988) of coal-fired generating plants (San Francisco Chronicle, March 20, 1980). This further diminishes the market expectation for this block.

Packet 3

Lessee: Kaiser Steel

1986: Unfavorable

1991: Uncertain

This block north of Sunnyside contains a very low grade Met coal with a potential use as steam coal. Its seams are inferior to the Kaiser south block, and it has at most an uncertain potential for 1991.

Packet 4

Lessee: Kanawha and Hocking Coal and Coke Company

1986: Unfavorable

1991: Unfavorable

A prohibitively high cost resource with no potential for competing even with a market larger than that posited.

Packet 5

Lessee: Wasatch Coal Company

1986: Uncertain

1991: Uncertain

Cannot be integrated into the adjacent Swisher No. 2 because of faulting so is limited to a 100,000 to 200,000 ton-per-year operation. Has no dominating high cost elements and transportation facilities are adequate for a small scale mine. It is under an apparently committed and optimistic control but faces severe problems in an abundantly supplied spot market.

Packet 6

Lessee: Carrol County Coal Company

1986: Unfavorable

1991: Unfavorable

Cannot be developed independently of the adjacent McKinnon Estate block (Packet 13). Because of the complex legal problem clouding the McKinnon Estate lease this otherwise excellent property is unfavorable for 1986 and 1991.

Packet 7

Lessee: Charles W. Kingston and J. O. Kingston

1986: Unfavorable

1991: Unfavorable

This block is adjacent to and can be integrated into Utah Power and Light holdings but unfavorable under present control.

Packet 8

Lessee: Consolidation Coal Company and Kemmerer Coal Company

1986: Unfavorable

1991: Uncertain

A possibly very large production unit and a creditable contender for long-term, large-scale commitment as a power plant or coal gasification supplier. The potential for making shipments to such consumers are unfavorable for 1986. This block shares uncertainty with other potential entrants for the expanded 1991 consumption.

Packet 9

Lessee: Intermountain Exploration Company

1986: Unfavorable

1991: Unfavorable

A possibility for small-scale production of lump coal for residential fireplaces and similar markets but these markets are highly limited compared to possible production and the potential for any one possible mine securing sufficient sales is so remote as to be unfavorable.

Packet 10

Lessee: Estate of John F. Sanders

1986: Unfavorable

1991: Unfavorable

Two small leases, SL-050655 and SL-062648 were separately considered. Both leases were judged to have unfavorable development potential for the limited sales opportunities of a residential lump coal market.

Packet 11

Lessee: Kaiser Steel Corporation

1986: Unfavorable

1991: Uncertain

This southern lease block is a potential large-scale efficient supplier of excellent quality steam coal. The expected market expansion by 1986 is insufficient to justify development. The expected market growth to 1991 is sufficient to raise the potential for development of this block to uncertain as a creditable rival for long-term, large-scale commitments. If the 1991 expectation were 40 million tons this property would have a favorable development potential.

Packet 12

Lessee: Lloyd Wilberg

1986: Unfavorable

1991: Unfavorable

The market for coal is not a relevant factor as the location of this lease in Straight Canyon places it in a no development area.

Packet 13

Lessee: Malcolm N. McKinnon (deceased)

1986: Unfavorable

1991: Unfavorable

An excellent property for producing marketable steam coal but complex legal problems create an unfavorable development potential.

Packet 14

Lessee: Nevada Electric Investment Company

U-020668

1986: Unfavorable

1991: Unfavorable

U-38727

1986: Unfavorable

1991: Uncertain

The second of these leases has the uncertain potential by 1991 of being an alternative, somewhat higher cost coal source for the Allen plant in conjunction with the adjacent Peabody leases. The first lease cannot be economically integrated with the Mohrland Mine because of faulting and as an independent development it would be economically disadvantaged in the market to 1991.

Packet 15

Lessee: Peabody Coal Company

1986: Unfavorable

1991: Uncertain

Uncertain 1991 development potential as a candidate source for Utah Power and Light generation but utilization by 1991 is not a necessary part of a coherent development.

Packet 16

Lessee: Smith-Holladay and Associates Ltd.

1986: Unfavorable

1991: Unfavorable

No potential for marketable production other than as a very small lump coal producer in an easily over-supplied, limited market.

Packet 17

Lessee: Swisher Coal Company

1986: Unfavorable

1991: Favorable

An excellent, marketable coal, somewhat disadvantaged locationally and would not normally be prioritized for 1991 development but can be brought in earlier at operator's discretion as part of an ongoing, viable operation.

Packet 18

Lessee: Caesar Fulton and Charles Denton

1986: Unfavorable

1991: Uncertain with remote potential

This lease has an unfavorable potential for 1986 development on procedural grounds. The 1991 potential is supplying space heating fuel to a very limited, sparsely populated, local market with a lower quality coal than what may also be available from one of the Frandsen leases.

Packet 19

Lessee: George H. Frandsen

SL-048223

1986: Unfavorable

1991: Uncertain but quite possible

SL-050638

1986: Unfavorable

1991: Unfavorable

The first lease, SL-048223, is a good coal in the context of supplying a very small (1000 to 5000 ton per year) local market for space heating fuel. One very small producer could be supported in this market and of the several possibilities, this personally committed individual has the advantaged position. The second lease (SL-050638) is an isolated poor seam with difficult access and a definitely unfavorable development potential.

Packet 20

Lessee: Aaron H. and Viola H. Rasmussen

1986: Unfavorable

1991: Unfavorable

A small, disadvantaged property with a highly unfavorable potential for supplying a thin local space heating market.

Packet 21

Lessee: Consolidation Coal Company

1986: Unfavorable

1991: Unfavorable

The market potential in the southwest for the next decade is too limited to justify the investment in transportation systems necessary

to efficiently open up these Kaiparowits holdings in the face of adequate existing supplier of Carbon-Emery-Sevier, New Mexico, and Wyoming coal.

Packet 22

Lessee: ElPaso Natural Gas

1986: Unfavorable

1991: Unfavorable

There is inadequate market potential in the southwest over the next ten years beyond what is now more efficiently served by existing systems. In 20 years, but not 10, the marketable volumes of coal may justify the investments in transportation and infrastructure necessary for efficient development.

Packet 23

Lessee: King Cannel Coal Company

1986: Unfavorable

1991: Unfavorable

A highly marketable, specialty fuel (very high content of volatile matter) with no regional substitute. This lease was classified as having an unfavorable potential for development on the basis of the declaration of reservation price of the present ownership.

Packet 24

Lessee: Nevada Electric Investment Company

1986: Unfavorable

1991: Uncertain

This portion of the Alton field is marketable by 1991 as an economically advantaged coal source to justifiable plants in Southern

Nevada. However, circumstances other than marketability (stripping in proximity to national parks, water supply for integrated slurry system, etc.) are sufficient to cause these holdings to have uncertain development potential for 1991.

Packet 25

Lessee: Peabody Coal

1986: Unfavorable

1991: Unfavorable

The market potential in the southwest for the next decade is too limited to justify the investment in transportation systems necessary to efficiently open up these Kaiparowits holdings in the fact of adequate existing supplier of Carbon-Emery-Sevier, New Mexico, and Wyoming coal.

Packet 26

Lessee: Resources Company, Mono Power Company, and New Albion
Resources Company

1986: Unfavorable

1991: Unfavorable

The market potential in the southwest for the next decade is too limited to justify the investment in transportation systems necessary to efficiently open up these Kaiparowits holdings in the fact of adequate existing supplies of Carbon-Emery-Sevier, New Mexico, and Wyoming coal.

Packet 27

Lessee: S. H. West

1986: Unfavorable

1991: Unfavorable

This small, partially burned holding has unfavorable development prospects for technical reasons independently of market conditions.

Packet 28

Lessee: Utah International Inc.

1986: Unfavorable

1991: Unfavorable

This portion of the Alton field leases has an unfavorable potential for development for both 1986 and 1991. It is a higher cost resource than the Nevada Electric holdings and has an unfavorable development potential for 1991 even if Alton coal is used for an Allen Plant.

Packet 29

Lessee: Coastal States Energy Company

1986: Favorable*

1991: Favorable *

These holdings are part of a logical mining unit for what appears to be an efficient operator with a strong and effective marketing program. The timing of development of a lease may not be optimal at a 1986 or 1991 date but is attainable within the discretion of the operator.

* Note: Opinion is that of author, not supported by OTA Utah task force which rated block as uncertain. This lease is not contiguous with the lessee's existing SUFCo Mine and is surrounded by unleased National Forest lands not identified for 1982 or 1984 lease sales.

Packet 30

Lessee: Energy Reserves Group, Inc.

1986: Unfavorable

1991: Uncertain

Good coal of limited marketability. The IPP requirements provide a conditionally uncertain development potential for 1991. If IPP does not materialize as a consumer of Utah coal this reserve would be better classified as unfavorable for 1991.

APPENDIX 1

Tables 1, 2, 5, 6, and 7 and Figure 1 of Rodger Weaver and David Moewes, "Electricity Demand Forecasting: A Survey of Methodologies and Projections," (A report of the continuing Research Program of the Utah Consortium for Energy Research and Education) Bureau of Economic and Business Research, College of Business, University of Utah (Salt Lake City, Utah) February 1980. This material is presented as being a recent compilation and careful examination of load projections. It is reproduced here with the approval of Dr. Weaver, and appreciation for his time and effort in reviewing this work is extended.

Tables 5, 6, and 7 present summary information regarding a number of load and peak load forecasts for various parts of the eleven western states and for various projection periods. Load forecasts are measured in gigawatt hours (gwh) of energy consumed in the area or kwh of energy consumed per capita. Peak load or demand forecasts are measured in MW of installed generating capacity. The projections are organized by geographic area with alternative projections for each area, where such are presented, appearing in subsequent rows. Some sources produce gwh projections, some MW and some both. For those which produce both, the gwh projection is presented immediately above the MW projection without spacing. In Tables 6 and 7, gwh, kwh, or MW denominations are continued from Table 5 to indicate the units in which the projections themselves were produced. In these two tables, the figures appearing are annual rates of change and per capita kwh or MW, respectively. The population projections used to calculate the per capita kwh or MW figures in Table 7 were taken from a variety

of sources. In some cases, the energy forecast was based on a particular population projection. In these cases, that projection was used. In another, no such projection was identified, so another source, either the U.S. Census or a state governmental agency, was selected. Since not all figures in Table 7 are produced from population figures which are consistent with the forecast, care must be exercised in interpreting the table. At best, the information in Table 7 provides a general feeling for the magnitudes of change in per capita electricity use which would be required if particular energy forecasts were realized. Detailed interpretations of these figures is inappropriate.

Figure 1



Source: WSCC Ten-Year Coordinated Plan Summary: 1978-1987, Salt Lake City, Utah, 1978.

Table 1

HISTORICAL FIRM PEAK LOAD

Year	MSCC		Northwest Power Pool	Rocky Mountain Power Area	Arizona-New Mexico Power Area	So. California-Nevada Power Area	No. California-Nevada Power Area
	Thousands of Megawatts	Annual Rate of Growth (%)					
1968	47.8	--	21.2	--	3.52	--	--
1969	47.9	0.2	20.8	2.43	4.10	13.2	9.66
1970	50.6	5.6	22.0	2.59	4.57	14.0	10.3
1971	53.6	5.9	23.9	2.90	4.94	15.8	11.4
1972	59.1	10.3	26.3	3.11	5.60	16.8	12.3
1973	59.2	0.2	26.3	3.28	6.12	17.2	12.8
1974	60.3	1.9	26.7	3.59	6.71	16.8	13.6
1975	63.2	4.8	28.7	3.75	6.56	17.2	14.0
1976	68.7	8.7	29.4	4.06	7.02	18.6	14.6
1977	68.0	-1.0	31.0	4.51	7.27	18.8	14.5
1968-77	+20.2	4.0	+9.8	+2.28	+3.75	+6.2	+5.5

Source: Base data from Western Systems Coordinating Council (WSCC).

Table 2

HISTORICAL FIRM ENERGY LOAD

Year	MSCC		Northwest Power Pool	Rocky Mountain Power Area	Arizona-New Mexico Power Area	So. California-Nevada Power Area	No. California-Nevada Power Area
	Billions of kwh	Annual Rate of Growth (%)					
1968	269.1	--	114.8	--	17.73	--	53.4
1969	289.4	7.5	124.1	13.10	20.02	75.8	55.7
1970	312.1	7.8	136.0	14.30	22.34	81.0	58.4
1971	325.9	4.4	130.3	15.79	24.35	85.7	61.9
1972	353.6	8.5	150.9	17.21	27.33	91.1	67.1
1973	365.6	3.4	152.8	19.41	30.08	94.2	69.1
1974	383.2	4.8	171.5	20.73	31.88	89.8	69.3
1975	383.2	0.0	167.2	21.59	30.08	91.0	73.4
1976	408.5	6.6	178.5	23.33	33.89	95.7	77.0
1977	410.6	0.5	178.0	24.37	35.64	96.6	76.0
1968-77	+141.5	4.8	+63.2	+11.95	+17.91	+25.9	+22.6

Source: Base data from Western Systems Coordinating Council (WSCC).

Table 5

LOAD AND/OR PEAK LOAD PROJECTIONS
(Load in Gigawatt Hours)
(Peak Demand in Megawatts)

Area (Substate, State, Group of State)	Projection or Source of Projection and Year Projection Produced	Projection Year			
		1980	1985	1990	2000
Western Systems Coordinating Council ^a (WSCC) (Eleven Western States plus parts of South Dakota, Texas and British Columbia)	"WSCC Ten-Year Coordinated Plan Summary 1979-1988" Firm Energy Load (1979) and "Coordinated Bulk Power Supply Program 1978-1988," Total Peak Load (1979)	492,441gwh 83,933MW	624,774gwh 104,863MW	710,831gwh ^b 127,554MW	155,719MW 176,098MW ^c
Northwest Power Pool Area ^a	WSCC "Summary" and "Program" (1979)	226,787gwh 40,415MW	288,230gwh 51,162MW	328,304gwh ^b 61,850MW	76,350MW 86,948MW ^c
Rocky Mountain Power Area ^a	WSCC Summary" and "Program" (1979)	30,600gwh 5,375MW	42,654gwh 7,404MW	50,747gwh ^b 9,400MW	12,161MW 14,037MW ^c
Arizona-New Mexico Power Area ^a	WSCC "Summary" and "Program" (1979)	44,733gwh 8,965MW	63,444gwh 12,294MW	73,821gwh ^b 15,429MW	18,861MW 21,294MW ^c
Southern California-Nevada Power Area ^a	WSCC "Summary" and "Program" (1979)	103,883gwh 21,463MW	127,209gwh 25,631MW	141,736gwh ^b 29,749MW	35,096MW 38,548MW ^c
Northern California-Nevada Power Area ^a	WSCC "Summary" and "Program" (1979)	86,436gwh 16,978MW	103,207gwh 20,326MW	116,223gwh ^b 24,370MW	28,864MW 32,168MW ^c
Pacific Northwest Utilities Conference Committee Area ^c (PNUCC area)	"Long-Range Projection of Power Loads and Resources for Thermal Planning," PNUCC West Group Area (PNUCC/West Group) (1978)	157,788gwh 33,000MW	188,469gwh 40,000MW	225,286gwh 47,500MW	265,259gwh
	PNUCC Econometric--High (NERA Model) (1978)	143,200gwh	184,600gwh	235,100gwh	306,800gwh
	PNUCC Econometric--Medium (1978)	140,400gwh	174,900gwh	212,400gwh	261,400gwh
	PNUCC Econometric--Low (1978)	137,600gwh	165,100gwh	189,700gwh	216,000gwh
	National Resources Defense Council (NRDC) (1977)	127,400gwh ^d	140,000gwh	---	126,000gwh

Footnotes for Tables 5, 6, and 7 on page 81.

Table 5 (continued)

LOAD AND/OR PEAK LOAD PROJECTIONS
(Load in Gigawatt Hours)
(Peak Demand in Megawatts)

Area (Substate, State, Group of States)	Projection or Source of Projection and Year Projection Produced	Projection Year			
		1980	1985	1990	1995
Northwest Regional Commission Region (Washington, Oregon, Idaho)	Northwest Energy Policy Project (NEPP)--High (1978) ^e	132,152gwh	156,661gwh	193,735gwh	248,892gwh
	NEPP--Medium (1978) ^e	126,778gwh	142,902gwh	164,748gwh	191,915gwh
	NEPP--Low (1978) ^e	120,476gwh	124,710gwh	131,364gwh	142,498gwh
	Washington State University (WSU)-- High (1975) ^e	140,638gwh	---	181,658gwh	---
	WSU--Medium (1975) ^e	128,332gwh	---	150,307gwh	---
State of Nevada	WSU--Low (1975) ^e	117,784gwh	---	128,039gwh	---
	Nevada Department of Energy (1976) ^f	10,320gwh	12,399gwh	14,764gwh	16,587gwh
	Utah Consortium for Energy Research and Education (UCERE)--Acceleration Scenario (1978)	13,907gwh	19,966gwh	28,663gwh	41,150gwh
	UCERE--Historical Scenario (1978)	13,333gwh	17,843gwh	23,878gwh	31,954gwh
State of Utah	UCERE--Conservation Scenario (1978)	12,775gwh	15,920gwh	19,839gwh	24,723gwh
	Utah State Energy Office Compilation (1978) ^g	2,355MW	3,489MW	5,169MW	7,663MW
	Utah Power and Light Company Service Area (UPL) 1978 ^h	14,659gwh	17,180gwh ⁱ	---	---
State of Colorado	Colorado Public Utilities Compilation (1978)	26,081gwh 4,686MW	36,174gwh 6,539MW	40,463gwh ^j 7,370MW ^j	---

Footnotes for Tables 5, 6, and 7 on page 81.

Table 5 (continued)

LOAD AND/OR PEAK LOAD PROJECTIONS
(Load in Gigawatt Hours)
(Peak Demand in Megawatts)

Area (Substate, State, Group of States)	Projections or Source of Projection and Year Projection Produced	Projection Year			
		1980	1985	1990	1995
State of California	{ California Energy Conservation and Development Commission (CEC) (1977) }	171,582gwh	206,844gwh	---	286,607gwh
		36,005MW	43,307MW	---	60,746MW
	{ Summation of 5 major utilities forecasts (1977) }	177,414gwh	221,813gwh	274,242gwh	335,317gwh
		37,403MW	46,118MW	56,431MW	68,412MW

Footnotes for Tables 5, 6, and 7 on page 81.

Table 6

LOAD AND/OR PEAK LOAD GROWTH RATE PROJECTIONS
 (All Figures in Average Annual Percentage Rates of Growth)
 (gwh Indicates Load, MW Indicates Peak Load)

Area (Substate, State, Group of States)	Projection or Source of Projection and Year Projection Produced	1980- 1985	1985- 1990	1990- 1995	1995- 2000	1980-End Projection
Western Systems Coordinating Council (WSCC) (Eleven Western States plus parts of South Dakota, Texas, and British Columbia) ^a	"WSCC Ten-Year Coordinated Plan Summary 1979-1988" Firm Energy Load (1979) and "Coordinated Bulk Power Supply Program 1978-1988," Total Peak Load (1979)	4.8%gwh 4.6%MW	4.4%gwh ^b 4.0%MW	4.1%MW	4.2%MW ^c	4.7%gwh 4.2%MW
Northwest Power Pool Area ^a	WSCC "Summary" and "Program" (1979)	4.9%gwh 4.8%MW	4.4%gwh ^b 3.8%MW	4.3%MW	4.4%MW ^c	4.7%gwh 4.3%MW
Rocky Mountain Power Area ^a	WSCC "Summary" and "Program" (1979)	6.9%gwh 6.6%MW	6.0%gwh ^b 4.9%MW	5.3%MW	4.9%MW ^c	6.5%gwh 5.5%MW
Arizona-New Mexico Power Area ^a	WSCC "Summary" and "Program" (1979)	7.2%gwh 6.5%MW	5.2%gwh ^b 4.6%MW	4.1%MW	4.1%MW ^c	6.5%gwh 4.9%MW
Southern California-Nevada Power Area ^a	WSCC "Summary" and "Program" (1979)	4.1%gwh 3.6%MW	3.7%gwh ^b 3.0%MW	3.4%MW	3.2%MW ^c	4.0%gwh 3.3%MW
Northern California-Nevada Power Area ^a	WSCC "Summary" and "Program" (1979)	4.2%gwh 3.9%MW	4.0%gwh ^b 3.7%MW	3.4%MW	3.7%MW ^c	4.8%gwh 3.6%MW
Pacific Northwest Utilities Conference Committee Area ^c (PNUCC area)	"Long-Range Projection of Power Loads and Resources for Thermal Planning," PNUCC West Group Area (PNUCC/West Group) (1978)	3.6%gwh 3.7%MW	3.6%gwh 3.5%MW	3.3%gwh		3.5%gwh 3.7%MW
	PNUCC Econometric--High (NERA Model) (1978)	5.2%gwh	5.0%gwh	5.5%gwh		5.2%gwh
	PNUCC Econometric--Medium (1978)	4.5%gwh	3.8%gwh	4.2%gwh		4.2%gwh
	PNUCC Econometric--Low (1978)	3.7%gwh	2.8%gwh	2.6%gwh		3.1%gwh
	National Resources Defense Council (NRDC) (1977)	1.9%gwh	---	-1.0%gwh ^m		-0.1%gwh

Footnotes for Tables 5, 6, and 7 on page 81.

Table 6 (continued)

LOAD AND/OR PEAK LOAD GROWTH RATE PROJECTIONS
(All Figures in Average Annual Percentage Rates of Growth)
(gwh Indicates Load, MW Indicates Peak Load)

Area (Substate, State, Group of States)	Projection or Source of Projection and Year Projection Produced	1980- 1985	1985- 1990	1990- 1995	1995- 2000	1980-End of Projection
Northwest Regional Commission Region (Washington, Oregon, Idaho)	Northwest Energy Policy Project (NEPP)--High (1978) ^e	3.5%gwh	4.3%gwh	5.1%gwh	5.7%gwh	4.7%gwh
	NEPP--Medium (1978) ^e	2.4%gwh	2.9%gwh	3.1%gwh	3.6%gwh	3.0%gwh
	NEPP--Low (1978) ^e	0.7%gwh	1.0%gwh	1.6%gwh	1.8%gwh	1.3%gwh
	Washington State University (WSU)-- High (1975) ^e	---	2.6%gwh ^d	---	2.5%gwh ⁿ	2.6%gwh
	WSU--Medium (1975) ^e	---	1.6%gwh ^d	---	1.9%gwh ⁿ	1.8%gwh
State of Nevada	WSU--Low (1975) ^e	---	0.8%gwh ^d	---	1.9%gwh ⁿ	1.4%gwh
	Nevada Department of Energy (1976) ^f	3.7%gwh	3.6%gwh	2.4%gwh	2.2%gwh	3.0%gwh
	Utah Consortium for Energy Research and Education (UCERE)--Acceleration Scenario (1978)	7.5%gwh	7.5%gwh	7.5%gwh	7.5%gwh	7.5%gwh
State of Utah	UCERE--Historical Scenario (1978)	6.0%gwh	6.0%gwh	6.0%gwh	6.0%gwh	6.0%gwh
	UCERE--Conservation Scenario (1978)	4.5%gwh	4.5%gwh	4.5%gwh	4.5%gwh	4.5%gwh
	Utah State Energy Office Compilation (1978) ^g	8.2%gwh	8.2%gwh	8.2%gwh	---	8.2%gwh
	Utah Power and Light Company Service Area (UP&L) 1978 ^h	5.4%gwh ^o	---	---	---	5.4%gwh
State of Colorado	Colorado Public Utilities Compilation (1978)	6.8%gwh 6.9%gwh	5.8%gwh ^p 6.2%gwh ^p	---	---	6.5%gwh 6.7%gwh

Footnotes for Tables 5, 6, and 7 on page 81.

Table 6 (continued)

LOAD AND/OR PEAK LOAD GROWTH RATE PROJECTIONS
(All Figures in Average Annual Percentage Rates of Growth)
(gwh Indicates Load, MW Indicates Peak Load)

Area (Substate, State, Group of States)	Projection or Source of Projection and Year Projection Produced	1980- 1985	1985- 1990	1990- 1995	1995- 2000	1980-End of Project
State of California	{ California Energy Conservation and k Development Commission (CEC) (1977) }	3.8%gwh 3.8%MW	---	3.3%gwh ^m 3.4%MW ^m	---	3.5%gwh 3.5%MW
		4.6%gwh 4.3%MW	4.3%gwh 4.1%MW	4.1%gwh 3.9%MW	---	4.3%gwh 4.1%MW
	{ Summation of 5 major utilities forecasts (1977) }					

Footnotes for Tables 5, 6, and 7 on page 81.

Table 7
PER CAPITA PROJECTED LOAD AND/OR PEAK LOAD
(All Figures Are Projected kwh or MW Divided by Projected Population)
(Indicated by kwh/cap or MW/cap)

Area (Substate, State, Group of States)	Projection or Source of Projection and Year Projection Produced	12,447kwh/cap ^q .0021MW/cap ^q	14,747kwh/cap ^q .0025MW/cap ^q	16,204kwh/cap ^b .0028MW/cap ^q	.0032MW/cap ^q .0035MW/cap ^q
Western Systems Coordinating Council (WSCC) (Eleven Western States plus parts of South Dakota, Texas, and British Columbia) ^a	"WSCC Ten-Year Coordinated Plan Summary 1979-1988" Firm Energy Load (1979) and "Coordinated Bulk Power Supply Program 1978-1988," Total Peak Load (1979)				
Northwest Power Pool Area ^a	WSCC "Summary" and "Program" (1979)				
Rocky Mountain Power Area ^a	WSCC "Summary" and "Program" (1979)				
Arizona-New Mexico Power Area ^a	WSCC "Summary" and "Program" (1979)				
Southern California-Nevada Power Area ^a	WSCC "Summary" and "Program" (1979)	12,076kwh/cap ^q .0024MW/cap ^q	16,690kwh/cap ^q .0030MW/cap ^q	17,631kwh/cap ^b .0035MW/cap ^q	.0040MW/cap ^q
Northern California-Nevada Power Area ^a	WSCC "Summary" and "Program" (1979)				
Pacific Northwest Utilities Conference Committee Area ^c (PNUCC area)	WSCC "Summary" and "Program" (1979) "Long-Range Projection of Power Loads and Resources for Thermal Planning," PNUCC West Group Area (PNUCC/West Group) (1978) PNUCC Econometric--High (NERA Model) (1978) PNUCC Econometric--Medium (1978) PNUCC Econometric--Low (1978) National Resources Defense Council (NRDC) (1977)				

Footnotes for Tables 5, 6, and 7 on page 81.

Table 7 (continued)

PER CAPITA PROJECTED LOAD AND/OR PEAK LOAD
(All Figures Are Projected kwh or MW Divided by Projected Population)
(Indicated by kwh/cap or MW/cap)

Area (Substate, State, Group of States)	Projection or Source of Projection and Year Projection Produced	1980	1985	1990	1995	2000
Northwest Regional Commission Region (Washington, Oregon, Idaho)	Northwest Energy Policy Project (NEPP)--High (1978) ^e	18,790kwh/cap	21,099kwh/cap	24,768kwh/cap	30,565kwh/cap	38,809kwh/cap
	NEPP--Medium (1978) ^e	18,026kwh/cap	19,246kwh/cap	21,062kwh/cap	23,568kwh/cap	27,002kwh/cap
	NEPP--Low (1978) ^e	17,129kwh/cap	16,795kwh/cap	16,794kwh/cap	18,218kwh/cap	18,405kwh/cap
	Washington State University (WSU)-- High (1975) ^e	19,996kwh/cap	---	20,366kwh/cap	---	---
State of Nevada	WSU--Medium (1975) ^e	18,247kwh/cap	---	17,589kwh/cap	---	---
	WSU--Low (1975) ^e	16,746kwh/cap	---	15,288kwh/cap	---	---
	Nevada Department of Energy (1976) ^f	14,098kwh/cap	14,939kwh/cap	15,757kwh/cap	16,358kwh/cap	16,919kwh/cap
State of Utah	Utah Consortium for Energy Research and Education (UCERE)--Acceleration Scenario (1978)	9,941kwh/cap	12,832kwh/cap	17,184kwh/cap	23,015kwh/cap	30,817kwh/cap
	UCERE--Historical Scenario (1978)	9,530kwh/cap	11,467kwh/cap	14,315kwh/cap	17,871kwh/cap	22,302kwh/cap
	UCERE--Conservation Scenario (1978)	9,132kwh/cap	10,231kwh/cap	11,894kwh/cap	13,827kwh/cap	16,072kwh/cap
	Utah State Energy Office Compilation (1978) ^g	.0017MW/cap	.0022MW/cap	.0031MW/cap	.0043MW/cap	---
	Utah Power and Light Company Service Area (UP&L) 1978 ^h	---	---	---	---	---
Colorado Public Utilities Compilation (1978)		9,693kwh/cap	12,090kwh/cap	13,095kwh/cap ^j	---	---
		.0017MW/cap	.0022MW/cap	.0024MW/cap ^j	---	---

Footnotes for Tables 5, 6, and 7 on page 81.

Table 7 (continued)

PER CAPITA PROJECTED LOAD AND/OR PEAK LOAD
(All Figures Are Projected kwh or MW Divided by Projected Population)
(Indicated by: kwh/cap or MW/cap)

Area (Substate, State, Group of States)	Projection or Source of Projection and Year Projection Produced	1980	1985	1990	1995	2000
State of California	{ California Energy Conservation and Development Commission (CEC) (1977) ^k	7,539kwh/cap .0016MW/cap	8,365kwh/cap .0018MW/cap	---	10,004kwh/cap .0012MW/cap	---
	Summation of 5 major utilities forecasts (1977)	7,795kwh/cap .0016MW/cap	8,970kwh/cap .0019MW/cap	10,257kwh/cap .0021MW/cap	11,705kwh/cap .0024MW/cap	---

Footnotes for Tables 5, 6, and 7 on page 81.

FOOTNOTES FOR TABLES 5, 6, AND 7

^aFor delineation of Western Systems Coordinating Council area and sub-regional Power Areas, see Figure 2.

^bProjection year is 1988.

^cProjection year is 1998.

^dData interpolated between published years.

^eProjections are also available individually for the states of Washington, Oregon, and Idaho.

^fPresently being revised upward.

^gThis compilation provides extensive substate geographic dissegregation.

^hExcluding non-tariff sale for resale.

ⁱProjection year is 1983.

^jProjection year is 1987.

^kArea covered accounted for 97.7 percent of total kwh sale in California in 1977.

^lThese are published in CEC's California Energy Trends and Choices: Volume 2, 1977 by individual major utility: Los Angeles Department of Water and Power, Pacific Gas and Electric, Sacramento Municipal Utilities District, San Diego Gas and Electric, and Southern California Edison. By law, CEC's projections are adopted for planning purposes by the utilities. Excludes Glendale, Pasadena, Burbank.

^mAverage annual percentage rate of growth 1985-1995.

ⁿAverage annual percentage rate of growth 1990-2000.

^oAverage annual percentage rate of growth 1980-1983.

^pAverage annual percentage rate of growth 1985-1987.

^qPopulation figures used exclude the parts of South Dakota, Texas, and British Columbia included in the WSCC area.